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n Trial

MOSCOW — Computer scientist Anatole Sharansky went on trial behind closed doors here last week despite protests from Western scientists and others.

Sharansky is accused of conspiring with the U.S. Central Intelligence Agency, a charge that has been vigorously denied by President Jimmy Carter.

Most observers feel Sharansky — who has been active in Soviet dissident circles — is really on trial for political activities in favor of more human rights in the Soviet Union.

Sharansky has been in prison since March 1977. Such groups as the Association for Computing Machinery, the National Academy of Sciences and the Committee of Concerned Scientists have supported his cause in contacts with Soviet leaders [CW, May 8].

Several of these groups have asked the Soviets for permission to attend the Sharansky trial, but have received no response

Sharansky faces a possible death sentence if found guilty.

Asks Go-Ahead From FCC

Bell Gives Glimpse of Packet Net

By Marguerite Zientara
CW Staff

NEW YORK — AT&T's public packet-switched network came partway out of the closet last week with its name changed from Bell Data Network to Advanced Communications Service (ACS).

The service, rumored in the industry for almost a year [CW, Sept. 5], is a shared, switched data communications network service featuring "multipackets." It will be available on a "broad geographic basis with a wide range of access arrangements," AT&T said in giving its first official glimpse of the offering.

However, Bell pulled back from giving complete details and prices, instead asking the Federal Communications Commission (FCC) for a declaratory ruling permitting the firm to offer the service in the future through its existing digital facilities.

The company said a declaratory ruling by the FCC would resolve any uncertainty about the use of its digital facilities and would clear the way for AT&T to file a tariff for the service in mid-1979. The availability of ACS and the rates, terms and tariffs that will apply to it will be subject to regulatory review and action at that time.

However, the proposal is sure to face stiff opposition before the FCC and it may be months — and possibly years — before AT&T receives a nod from the FCC to proceed with ACS.

Response to Users

AT&T developed ACS in response to such user problems as the inability of terminals and computers in one network to communicate with terminals and computers in other networks, according to the petition it filed with the FCC.

These incompatibility problems inhibit reliable and efficient intra- and intercompany communications, the petition said. Multiple networks have also resulted in a "substantial underutilization of the users' data communications personnel, equipment and transmission facilities."

The digital facilities that are the subject of the petition are those for which the commission granted construction and operating authority when applications were filed for Bell's Dataphone Digital Service (DDS) and Dataphone Switched Digital Service (DSDS). AT&T also plans to use its analog facilities in the implementation of ACS.

ACS compatibility will permit a single terminal to access multiple applications over a shared network, according to the petition. The necessary code conversion, protocol translation and speed matching will be provided by the service.

The ACS network will consist of a series of switching centers called nodes. As the basic building blocks of the network, the nodes will be connected using 56k bit/sec digital or analog trunks of the existing Bell network, the company said, with tandem switches handling traffic.

Development Plans

AT&T plans to offer ACS initially within selected serving areas in as many as 100 metropolitan areas in the U.S. It is currently developing a preliminary rate plan for the service.

AT&T estimated 50 to 100 ACS nodes will be installed across the country by the mid-1980s. It plans to start the service with one node and probably expand to three by the end of 1979, according to Wayne Robins, director of data networks.

The nodes will be able to execute both system- and "customer-customized" programs, Bell said, and will provide facilities for "storage and execution of noninteractive customer-customized programs."

If allowed to proceed with ACS, Bell's filing predicted it would have

(Continued on Page 6)

Urges DP, Services Link

Revamp Team Issues Draft Report

By Edith Holmes
CW Washington Bureau

WASHINGTON, D.C. — The nation's leaders must begin to use information technology to reduce the costs of government, absorb the effects of inflation and improve the delivery of services to the public, the federal data processing reorganization project concluded in the draft of its final summary report obtained by *Computerworld* last week.

Guidance in the use of computers, communications and information must come from the highest levels of government, the draft report stated. To that end, the DP reorganization project would have President Carter establish an Office for Information Resource Management in the Office of Management and Budget (OMB); an information resource manager within each department or agency; a special assistant to the President for information technology policy, plans and programs; and a National Council for Information Technology Policy, Plans and Programs.

This is the first of nine major recommendations the 55 public- and private-sector individuals who participated in the project hope will move the federal government into the information age. In addition to proposing a structure designed to help the government take a lead in advocating the use of information technology, they also suggested mechanisms for updating the government's DP equipment, improving its means of acquiring computer and communications tools and making individuals accountable for specific information systems.

The group also made suggestions for revising personnel policies, providing managerial and technical assistance, enlarging federal R&D efforts, revitalizing the standards program and enhancing the government's delivery of services.

The report's drafters see their role in

(Continued on Page 4)

Ex-Police Chief Indicted in Sale Of Crime Data

By Brad Schultz
CW Staff

WHEATON, Ill. — An Illinois grand jury here has indicted a former municipal police chief on 24 counts of "official misconduct, conspiracy and theft" involving the sale of confidential criminal histories stored on the state's computerized crime data network.

Culminating a three-month probe into what has been called the most prolific abuse of a police data bank in Illinois history, the grand jury charged Donald L. Saccamonto with secretly selling the histories for more than $14,000 to a trucking firm that used them to screen job applicants.

Saccamonto allegedly sold the histories, stored on the Law Enforcement

(Continued on Page 4)

Survey Finds DPers at Top Of Most Wanted Workers

By Ann Dooley
CW Staff

PHILADELPHIA — DP specialists are near the top of employers' most wanted lists when it comes to hiring skilled professionals, according to a recent survey by Fox-Morris Personnel Consultants in which more than 4,850 firms across the U.S. were polled.

The survey, which is conducted annually, showed employers' demands for DP specialists as a whole rose 21.7% over 1977 demands. Further, among all existing DP job categories mentioned, programmers with two to five years' experience were in the highest demand.

Second in demand were systems analysts, followed by telecommunications specialists, new computer science graduates, accountants with computer backgrounds and various levels of DP managers, according to the survey.

The firms polled represented a wide spectrum of business and industry and included small, medium and large DP centers. Employers' answers showed an unprecedented overall demand for DPers in every category, a Fox-Morris spokesman said.

The survey results also showed salaries up by an overall 12.4% over year-ago figures. Top-level DP directors can demand salaries of $45,000 or more per year — an increase of 20% over 1977 figures.

Programmers' salaries overall have risen 16% to 18%, according to the survey. Specialists with experience in telecommunications and DP auditors, although less in demand, nevertheless

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Despite Hung Jury

Memorex Trial Edge Goes to IBM

By Catherine Arnst
CW Staff

Although reaction to the hung jury finale of the Memorex Corp. vs. IBM antitrust trial has been mixed, most industry observers interviewed last week agreed it benefited IBM rather than Memorex. Despite the 9-2 split of the 11-person jury in favor of Memorex, Memorex's stock dropped 12 points the week of the verdict while IBM's stock rose.

"It was an important psychological victory for IBM," according to Frederick Cohen, vice-president of research for Legg Mason Wood Walker, Inc. "IBM is in as good a psychological position as it could be. It makes sense it would try to settle as many of the other antitrust suits brought against it as soon as possible before another trial commences."

Memorex's stock was already "heavily underpriced," Cohen said, and probably would have risen to its proper level had it won this case. Memorex has spent approximately $6 million on its legal defense and $500,000 on the trial alone, he estimated, noting there would have been a substantial return on that investment if the jury had voted unanimously in Memorex's favor.

Rebound Forecast

Memorex's stock may bounce back after the short term, however. Calvert Crary, a securities analyst with Bache Halsey Stuart Shields, Inc., attributed the current dip to the dumping of shares by people who bought them speculating on a large damages award (Memorex asked for some $900 million).

"Many people are still excited about Memorex as a company, so the result of the lawsuit will have little effect on them," Crary said. "If anything, the 9-2 split makes Memorex look better."

Harry Edelson, a securities analyst with Drexel Burnham Lambert, Inc., agreed with Crary. Although Memorex may be hurt somewhat at this time, "it is a fine company in its own right and Memorex can still be an attractive stock," he said.

Although Edelson also believes the stock is underpriced and selling at a relatively low earnings multiple of seven times its earnings power, compared with the rest of the industry, "the stock has come up a long way in the last few years," he said.

Memorex itself perceived the verdict as at least partially favorable. "We are pleased that nine of the jurors apparently agreed not only that IBM has monopoly power, but also that it used that power improperly against Memorex . . . We think we know the reasons why the jury could not agree and believe those things can be addressed in a new trial," a spokesman said.

"The company has made a significant investment in the case in terms of both time and resources, and it is our intention to proceed with a new trial as soon as that can reasonably be done," he added.

Advantage in Settling

The nonverdict may have signaled to other firms bringing litigation against IBM "the futility of suing IBM" under the Sherman Antitrust Act, Edelson said. Transamerica Computer Corp. is scheduled to go to trial with a jury against IBM Nov. 6; California Computer Products, Inc. is appealing a directed verdict awarded IBM in its trial; and Greyhound Computer Corp. is preparing for trial after the directed verdict IBM won when the original trial was overturned on appeal last year.

"It would certainly be to the advantage of all litigants to settle," Edelson said. The major incentive for settlement should be saving management time, which is the biggest cost of any major corporate lawsuit, he added.

With a settlement, the managements of the various companies involved in actions against IBM could then concentrate their attention on the business at hand, he said. James Peacock, a vice-president of International Data Corp., also said he would not be surprised to see settlements at this time.

However, although settlements may benefit the parties directly involved, they would be detrimental to the industry, according to A.G.W. Biddle, president of the Computer & Communications Industry Association. "It wouldn't change IBM's power over the market, and it would hurt the rest of the industry in the long run," he said.

Transamerica, at least, plans to press its case, which is "considerably different" from Memorex's case, according to James Rush, Transamerica president. The firm is also asking a jury trial and expects to take four months to try its case, in which it is asking for $130 million in damages.

'We Will Prevail'

IBM plans to continue to press for a directed verdict in the Memorex action, according to lead trial attorney Patrick Lynch and Frank T. Cary, IBM chairman of the board. "We feel our position is correct and that we will ultimately prevail," Cary said.

Although Lynch "sincerely believes IBM is entitled to a directed verdict, this is the fourth time we've made this pitch to Judge Samuel Conti, so the odds are against it."

IBM opposed a trial by jury, preferring that the judge be the finder of fact — not because the firm considers a jury incompetent, but because a jury does not have to give reasons for its verdict; a judge must present justifications for his decision, Lynch said.

"There is no requirement that a jury come to a verdict on the basis of the facts — there is no idea how they got to a decision," he added. Jury members want to bring in a result and will often compromise to do so, he said.

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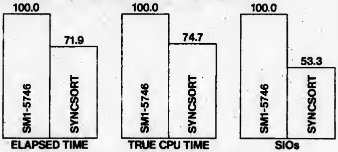

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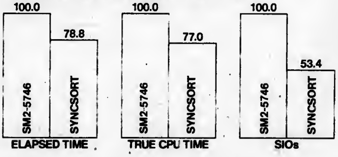

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Revamp Team Urges Better DP, Services Tie

(Continued from Page 1)

convincing the nation's leaders of the importance of exploiting the power of information technology today as analogous to Billy Mitchell's call for air power in the 1930s. Those pleas "fell on deaf ears," the report said, and the reorganization team wants to avoid a similar response.

Policy's Focal Point

The reorganization project envisions the OMB Office for Information Resource Management as a "focal point" for aggressively advocating the use of information technology.

The information resource manager in each agency would serve directly under the organization's head and be accountable for the agency's "effective and efficient" use of computers and communications. These managers would be charged with encouraging technological innovation in their agencies's delivery of human services, according to the draft report. They would also ensure that their organizations follow the policy dictates of OMB, the General Services Administration (GSA), the Commerce Department and the 1965 Brooks Act.

The special assistant to the President would serve as the nation's senior advocate for information technology and set national and federal goals for that technology's use.

Finally, the reorganization project recommended that the National Council for Information Technology Policy, Plans and Programs — chaired by the special assistant and the executive director of the OMB Office of Information Resource Management and made up of the information resource managers — keep the President informed on the state of the technology and its application to government and national task.

In 10 years, 80% of all government offices should have on-line connections to one or both of two information networks — one for national security and the other for the rest of government, the draft report said. The same amount of time should be sufficient to implement the "office of the future" concept throughout government, the recommendations continued.

Government offices should be connected wherever productivity can be enhanced without threatening the right of privacy. An problems of privacy, security and reliability or "robustness" of common-user networks should be addressed and solved within the next five years, the reorganization project stated.

Better Service to Citizens

Ten years from now, a citizen with a question about the delivery of government services or the collection of information or taxes should have one convenient place to turn for help. By then, 60% of the federal work force should be familiar and comfortable with text and form processing and storage, message systems, data management and information retrieval, the draft report said.

Within four years, the U.S. should 'reachieve . . . a 'lengthening lead' " over those nations most advanced in information technology, the project's members contended.

The federal government can best meet these general goals by removing all the outmoded information technology equipment it now relies on over the next five years. In addition, a "significant" fund — in the neighborhood of $1 billion — should be made available through the National Council for Information Technology Policy, Plans and Programs to provide incentives for agencies to reduce service delivery costs by using computers and communications, the draft report stated.

When it comes to acquiring new equipment, greater procurement responsibility should be delegated to the agencies, the reorganization project concluded. GSA should only become involved in procurements of more than $300,000, and agencies should be "certified" to conduct equipment acquisitions of greater cost based on the technical and managerial expertise each organization possesses, the report said.

OMB Urged to Act

OMB must take the lead in clarifying its authority and GSA's in the acquisition process. Inconsistencies in policies and procedures must be eliminated, and the approach to procuring new information tools should be simplified, according to the project's members.

User organizations should be made responsible for the management of information technology resources, the report stated. To achieve that goal, the reorganization project recommended that OMB require DP costs to be charged back to the using agency and program wherever possible.

The reorganization project also recommended that the importance of the people who design and operate information systems be emphasized more than it has been. The federal government should upgrade training and career development for DP managers and personnel, create a new series of jobs under the occupational heading of "information science" and modify compensation legislation to allow incentive awards in the form of "percentage-of-salary" bonuses, the project's draft report suggested.

The present GSA ADP fund, established 13 years ago by the Brooks Act, could be used in part to finance "specialized assistance centers" to provide cost-reimbursable managerial and technical services to the government whenever these aids are needed. The Department of Commerce should sponsor a federation of these organizations in an effort to create a community of DP expertise within the federal government, the reorganization project recommended.

The federat government needs to institute an R&D program in information technology to meet the requirements of its nondefense sector, the draft report said. This program should be established at an initial level of $25 million and increased over a period of about five years to approximately $100 million.

In addition, schedules should be established for needed standards, and the standards program should be expanded immediately to address the issue of data and human services delivery, the draft report stated.

Finally, the reorganization team members suggested that a Presidential task force be created to investigate the possibility of establishing a nationwide network of service delivery centers designed to support human services application and eligibility processing and determination.

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Ex-Police Chief Charged

(Continued from Page 1)

Agencies Data System (Leads), to Riss International of Kansas City, Mo. [CW, July 3]. Most of the indictment's counts pertain to this activity, said to have occurred during a period of about two years while Saccamonto was police chief of Glendale Heights, Ill., in DuPage County near Chicago.

Leads is Illinois' central reservoir of criminal information, containing criminal histories as well as records of wanted and missing persons and stolen articles and securities. It can be used to access the National Crime Information Center (NCIC) run by the Federal Bureau of Investigation in Washington, D.C.

As a police chief, Saccamonto was able to personally access Leads via a DuPage countywide police radio service called Du-Comm, according to Robert Sauer, the chief for Hanover Park, Ill. DuPage municipal chiefs had taken measures to prevent the transmission of NCIC data through the Du-Comm system, Sauer said, but Saccamonto could have obtained the histories he allegedly sold Riss by requesting them from specific police agencies in the Kansas City vicinity.

He apparently did this by sending "directed messages" that normally are not monitored, according to Sauer, who explained transactions for data other than criminal histories — such as ownership of a motor vehicle — are commonly handled by Leads/Du-Comm.

Newspaper Prod

The grand jury investigation was sparked by a series of articles in the *Wheaton Daily Journal* that charged William Solak, director of loss prevention and claims for Riss, paid Saccamonto to run record checks on at least 80 persons who had applied for jobs with Riss.

The grand jury decision to indict Saccamonto was based mostly on Solak's testimony, according to informed sources. The details of that testimony have not been made public since grand jury investigations are secret.

Solak has not been indicted in the case, according to Illinois state prosecutor Robert Anderson, who is directing the state's case. One well-informed source speculated that Solak agreed to provide information on the matter in exchange for immunity from prosecution — a possibility Anderson refused to discuss.

The *Daily Journal* brought Saccamonto's purported indiscretions to light in a sries of articles principally written by the paper's Ernest H. Tucker. Documented evidence, including correspondence between Saccamonto and Solak, was provided Tucker by an unidentified individual.

However, Du-Comm users were already suspicious by then, according to Sauer. The Du-Comm dispatching center — an emergency, rather than general administrative unit — had been experiencing an unusual volume of directed message traffic not accounted for by any rise in caseloads, he said.

Preoccupied with emergency work, the dispatching staff complained about the increased volume, "so this was how we got wind of it," he added.

Most of the indictment's counts are addressed to "official misconduct," a felony punishable by one to three years' imprisonment and a fine of up to $10,000.

Saccamonto surrendered to state authorities shortly after announcement of the grand jury indictment. He pleaded not guilty to all charges and has been released on a personal recognizance bond of $10,000. No trial date has yet been set.

Two-Part Program Under Way

N.Y. Medicaid Fraud Search Nets $31 Million

By Ann Dooley
CW Staff

NEW YORK — A computerized search here for fraud and errors by city medical practitioners in this state's Medicaid program has led to the recovery of $31 million in overbillings, according to James Durkin, director of audit and quality control for the New York State Medicaid program.

Since it began operation two years ago, the system has also reduced Medicaid costs by $27 million, and Medicaid officials expect even further reductions as the entire system — one of the country's most sophisticated of its kind — is fully implemented throughout the state.

So far, the system has identified 51 doctors as excessive billers and the city has indicted 136 people, primarily doctors, for Medicaid fraud in the last 18 months.

The overall program is being operated in two segments. The first, under the auspices of the state Fraud and Abuse Division, has been tracking Medicaid payments over the last five years, and Bradford National Corp., a Medicaid management information system (MMIS) firm, is handling current billing claims [CW, May 23, 1977].

Five-Year Retrospective

The fraud and abuse operation collected the last five years of billing information from the city Medicaid program and set up routines for known billing abuses such as "ping-ponging" — sending a patient from one Medicaid practitioner to the next — or billing for over-prescriptions, Durkin said.

To find any billing discrepancies, all Medicaid billing information is entered into an IBM 370/158, whcih produces a summary comparing medical practitioners with their peers. Any individual whose billing data stands out or seems unusual is checked further. The system was also designed to match billing information for doctors and druggists, for example, in order to find any kickback possibilities, Durkin said.

90 Edit Routines

A total of 90 edit routines were programmed into the system to check on all the practitioners operating in the Medicaid program, he explained. Medicaid billing information on doctors as well as druggists, nursing homes, optometrists and a variety of other Medicaid practitioners has been input.

The edit sorts are used to compare such data as average bill per client, number of patients seen per day, number of prescriptions dispensed and visit charges. Duplicate billings and billings for dead patients are also noted.

More than 200 million character records have been input and organized in various ways to catch Medicaid abusers. Primary methods include the peer comparison, a check of services rendered and a check for specific abuses such as ping-ponging, "family ganging" or excessive first visits.

Once any unusual figure or occurrence is found, the state auditing staff produces a complete report on that practitioner, according to Seth Grossman, director of the social service program operations. Not all of the hits point to fraud, he noted. Some may have occurred through simple mistakes in recordkeeping.

The system also tracks the status of ongoing investigations and the status of refunds being paid back to the state by Medicaid practitioners.

MMIS Contract

The MMIS contract through Bradford is an on-line bill-paying system that will eventually eliminate many of the functions now being performed by the retroactive system, according to Charles Christopher, deputy commissioner of management information services.

The MMIS, fully operational here in November 1977, began by examining physicians and clinics and later added pharmacies and in-patient hospitals. Several other practitioner groups will soon be added.

The MMIS handles current claim payments and is designed to handle data on both patients and practitioners in order to cut down abuse. The system will examine Medicaid receipts and edit the data to ensure the correct fees are being charged. The system will also check that the practitioner is not filing duplicate bills or otherwise abusing the system. Its checks will be similar to those done by the retroactive system.

The program will also correlate claims between practitioners and perform matches with data from various other agencies such as Blue Cross/Blue Shield and Medicare, Christopher said.

In addition, the system can build profiles on recipients to help spot habitual drug users or unqualified individuals, he noted.

The Medicaid claims are batched and keyed into the system's Univac 1143 to build the practitioner and recipient files. Since the MMIS was instituted, the program has saved more than $8 million and officials estimate it will save $300 million per year when it is implemented throughout the state.

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FCC Filing Gives Glimpse of Bell Packet Net

(Continued from Page 1)

137,000 terminals or computers hooked into the network by 1983 out of an estimated total population of 3.6 million such devices at that time.

Robins said the effect of ACS on AT&T would be "increased total dollars for the Bell System." He projected a revenue potential from ACS of "around $500 million" by the mid-1980s.

Integrated Network

The petition said ACS will allow a customer to integrate its diverse data communications networks and equipment into a single network. Such compatibility, the petition said, will enable terminals to access multiple data communications applications and customer data bases, rather than just one application or data base, thereby improving the utilization of data communications equipment and facilities.

The system will provide a "framework within which users can tailor subnetworks of computers and terminals to fit their specific applications and will permit easy reconfiguration of such networks, the company said.

AT&T claimed ACS will relieve the user's burden of communications network management" by providing information on the status, usage and performance of the "virtual subnetworks" established within the ACS network. AT&T defined "virtual subnetworks" as "the logical arrangement of a customer's terminals and host computers connected to the ACS network."

Customers could use the status information to better manage and control their data communications resources directly from their own premises, AT&T said.

ACS would let users eliminate the high startup costs normally associated with the development and implementation of data communications systems by allowing a gradual phasing of applications into ACS, the firm added.

ACS will support a variety of terminal classes "reflecting a broad range of characteristics" including slow-speed through high-speed, commonly used code sets (Ascii and Ebcdic), polled and contention line control, character mode and block mode, asynchronous and synchronous and clustered and stand-alone. A number of computer protocols will be supported by the system as well.

Terminals will be connectable via point-to-point or multipoint private lines from customer premises into ACS by means of either digital or analog facilities, Bell said. Terminal connections may also be provided using dial-up access, the petition said, adding that computers will be connected to ACS via digital or analog private-line facilities.

AT&T named five basic classes of terminals "in the installed base of general-purpose terminals" on which ACS would concentrate. They are asynchronous contention — character mode; asynchronous contention — block mode; asynchronous polled; synchronous polled; and synchronous contention.

The petition also said that ACS by supporting the most widely used protocol in each of these five classes, will offer potential connectivity to an estimated 450 different terminal models produced by approximately 100 different terminal manufacturers. AT&T believes these terminals represent more than two-thirds of the installed base of general-purpose terminals.

According to the petition, access to or egress from ACS may be obtained in three ways:

- Via an ACS access line, either digital or analog, when the customer's premises is located within an ACS serving area.
- Via a private-line service, DDS or telephone company-provided entrance facility when the customer's premises is located outside an ACS serving area.
- Via the public switched network through a dial-in port (either shared or dedicated to the ACS customer) or a dial-out port (dedicated to the ACS customer only).

Message-Switching Service

In petitioning for a favorable declaratory ruling, AT&T asserted that "the offering of ACS as a common carrier communications service is consistent with the commission's rules relating to the use of computers by common carriers in that the service is a message-switching service . . . wherein the substantive content of the customer's message is not changed by the carrier."

DPers Among Most Wanted

(Continued from Page 1)

made gains of 20.1% and 10.3%, respectively, over last year's salaries, according to the survey.

Systems analysts experienced an overall increase of 11.1%, and DP operations managers' salaries rose 13.1%.

Nearly 90% of the employees' salary statistics were taken from workers with two to 10 years of experience since that is the largest current work experience pool, Fox-Morris said.

As for entry-level DPers, they, too, experienced gains in 1978 — 8.9% overall.

"It is not uncommon for a top-notch entry-level B.S. graduate to be offered as much as $19,200 to start, although the national average starting salary is not that high, of course," Fox-Morris President Sanford L. Fox said.

Top Ten

According to the firms polled in the survey, the top 10 most needed DP specialists in 1978 are, first, applications programmers with two to five years' experience; second, systems programmers with up to eight years' experience; third, software programmers with two to seven years' experience; fourth, systems analysts with two to nine years' experience; fifth, telecommunications specialists with two to six years' experience; and sixth, computer science graduates at the entry level.

The survey also reported typical mean starting salaries for the different DP occupations based on the average number of years the majority of employees have spent in that occupation. Programmers with 4.2 years of experience were shown to have earned an average $20,500; applications programmers who averaged 3.5 years of experience earned $19,300; systems analysts with 5.5 years of experience earned $23,000; and computer science graduates in entry-level positions earned $12,450.

Telecommunications specialists with 2.5 years of experience earned $21,450 a year; DP auditors with three years earned $21,000; and systems and software programming managers with 6.7 years' experience earned $27,300.

Operations managers with a mean average of 8.5 years of experience earned $28,000 yearly; administrative managers with 11.5 years earned $30,200 and corporate MIS directors with 14[illegible] average years of experience earned $[illegible]6,800.

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Debates in Congress Near On Transborder Data Flow

By Ronald A. Frank
CW Staff

WASHINGTON, D.C. — The policy issues raised by the flow of digitized data across national boundaries will be debated in Congress soon when two bills, now pending, are brought up for consideration.

In the House of Representatives, the rewrite of the Communications Act of 1934, now being referred to in some quarters as the Communications Act of 1980, contains a section on international common carriers that states, "The flow of information transmitted across national boundaries should not be restricted by any nation except to the extent necessary to protect its national security and the personal privacy of its citizens."

The question is dealt with more directly in the Senate, where an appropriations bill for the State Department, International Communications Agency, the Board for International Broadcasting and other purposes is under consideration.

The Senate Committee on Foreign Relations has released a report relating to Section 402 of Senate Bill 3076 stating, "The committee believes it to be imperative that the U.S. government establish effective procedures by which to develop and maintain a comprehensive U.S. policy" in the area of transborder data flow.

This section, entitled "International Communications Policy" and initiated by Senators George McGovern (D-S.D.) and Charles Percy (R-Ill.), calls upon the President to send to Congress by January 20 a report detailing "the policymaking mechanism which has been developed (on transborder data flow) . . . and the goals and general policies (not negotiating positions) of the U.S. with regard to anticipated international meetings which will address communications and information issues."

Conferences Noted

Section 402 of the bill states: "A series of multilateral meetings scheduled to convene in 1978 and 1979 including the 20th General Conference of the United Nations Educational Scientific and Cultural Organization (Unesco) and the 32nd United Nations General Assembly, the U.N. Conference on Science and Technology and the World Administrative Radio Conference (Warc) of the International Telecommunications Union will address a complex variety of international communications and information issues and will likely, through the promulgation of binding agreements relating to such issues, have a significant and lasting effect on the free flow of information and ideas among the nations of the world."

The section goes on: "Although the U.S. is a leading user of communications channels and information in the world, the U.S. government has neither formulated a comprehensive policy regarding the various communications and information issues that have entered international discussions, nor even established an effective mechanism by which to develop and coordinate U.S. policy on these issues."

The proposed bill would require the President by next January to report on procedures by which to develop and maintain a comprehensive policy regarding international communications and information issues as well as U.S. goals and positions with regard to anticipated international meetings which will address communications and information issues.

The bill further requires the President to issue supplementary reports as modifications, when and if the goals are modified.

The provisions of the Senate bill will be ironed out by a Senate House conference committee, but sources close to the legislation expect the provisions dealing with transborder data flow to pass with few or no changes.

Subset of PL/I Standard Ready for Public Review

WASHINGTON, D.C. — American National Standards Institute Committee X3 has developed a subset of the PL/I standard (X3.53-1976) and it is available for review and comment before the formal X3 voting.

PL/I is widely used for general-purpose computing. The proposed subset is also general-purpose, but has been restricted in a number of areas to allow support of the subset at a substantially lower overall cost, an X3 spokesman explained.

Typically, PL/I has required a large and complex compiler and library to support it and a major effort to understand the whole language. The subset is small enough to greatly reduce all three of these efforts, he said, but is large enough to cover most users' needs.

In addition to being offered for reactions from PL/I users, computer manufacturers and software firms in the U.S., the proposed subset is also being considered by the International Standards Organization.

The Computer and Business Equipment Manufacturers' Association (Cbema) is the Secretariat of X3. Copies of the proposed standard, identified as BSR X3.74, may be obtained for $2 from Cbema/-Standards, 1828 L St. N.W., Washington, D.C. 20036.

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OMB, GSA Roles in DP Buying Found Weak

By Edith Holmes
CW Washington Bureau

WASHINGTON, D.C. — The federal agencies assigned the task of ensuring that the U.S. government makes the most "efficient and effective" computer buys have been inadequately staffed to carry out the responsibilities given them by a 1965 law.

The Office of Management and Budget (OMB) and the General Services Administration (GSA) have failed to fulfill the roles envisioned for them by Public Law 89-306, the now 13-year-old Brooks Act that was intended to make the government's acquisition and use of DP goods and services both orderly and economical, according to the federal DP reorganization study's acquisition team.

In its draft report recently released here, the team charged that "OMB has maintained too low a profile in formulating effective DP policy," the responsibility given to the agency by the Brooks Act.

OMB 'Pound-Foolish'

"Policy that would provide adequate overall guidance for billions of dollars of annual computing acquisitions is deficient for the sake of a few hundred thousands of dollars annually for people resources," the team's report stated. "In essence, OMB has been penny-wise and pound-foolish for reasons of public image."

With overall responsibility for procuring hardware and software, GSA's Automated Data & Telecommunications Service (ADTS) could become the undisputed authority on acquiring computing resources, but hasn't done so, as far as the other federal agencies are concerned. Technical expertise and an appreciation for each program agency's concerns in a specified procurement situation are required, and these qualities demand "a commitment which GSA has not demonstrated," the reorganization team said.

"The attitudes of the program agencies toward GSA-ADTS and the fact that GSA-ADTS has had to delegate in excess of 90% of all procurement requests back to the program agencies leads us to conclude that there is insufficent staff within [the organization] to fulfill the responsibilities expected of it," the draft report said.

Variety of Interpretations

In the absence of clear policies from OMB's Information Systems Division staff of five, differences abound in the interpretation of the Brooks Act and particularly as to GSA's role under that law. With only 80 people to develop detailed procurement guidance, to work closely with each agency in specific computer acquisitions and to conduct the majority of computing resources procurements, GSA's ADTS has become "a single throttle point . . . for use by congressional committees in controlling DP acquisitions," the reorganization team found.

The many interpretations of the 2-1/2-page Brooks Act also stem from the myriad of policy directives, management and procurement guidelines and implementing instructions issued by OMB, GSA and the individual federal agencies. After examining this body of written guidance, the reorganization team concluded that it must be improved in content and simplified in structure.

Today, hardware, software and services manufacturers are brought into the federal computer acquisition process before all the necessary government approvals have been obtained. In some cases, the final procurement ultimately has been denied, causing a waste of time and money to industry and government alike, the reorganization team discovered.

"Checkpoints are needed in the acquisition cycle to ensure that the completion of the procurement is reasonably certain before outside organizations are asked to make an investment," the draft report stated.

Without clear guidelines from OMB and GSA and because of increasing interest in possible misuses of computer technology and the enormous cost of computing and communications, congressional committees have become more involved in system acquisitions over the last two years, the reorganization team found.

"The House Committee on Government Operations and, to a lesser extent, other congressional committees and regulatory agencies use the DP procurement process as a lever to force better management practices upon the various federal agencies," the report said. Since 1976, the Government Operations Committee, chaired by Rep. Jack Brooks (D-Texas), has directed GSA to place approximately 30 "holds" on agency procurements with which it has found fault.

Process Made Awkward

These holds generally come late in the procurement process, can last for months or even years and serve to make the acquisition process awkward and confusing, the reorganization group concluded. Often, the agency concerned does not know which management practice or action the committee is questioning, the team added.

While many federal agencies have complained that the acquisition process takes too long, the reorganization team said that, given the government's procurement objectives, the time taken compares favorably with experience in corporate industry. The government's procurement goals are not so much at fault as the last-minute consideration of such issues as privacy and security and the "complicated morass of regulations, controls and reviews" leading to the acquisition of a computer system, the draft report suggested.

Changes to the fiscal procedures that accompany computer acquisitions would also remove much of the wasted effort and save millions of dollars, the reorganization team said. Congress needs to be aware of and to review proposed multimillion-dollar acquisitions through the agencies' budget process long before the actual procurement is scheduled to take place, for example.

Funding Methods

An improvement in the method of funding for computer purchases and leases is necessary, the acquisition team stated. In addition, the team observed that the government has lost millions of dollars by not having funds available for purchase and multiyear leasing.

Among the options the acquisition team is considering recommending is an increase in the capitalization of the ADP Fund, a mechanism established under the Brooks Act to meet the peculiar needs of computer procurements. The fund could be capitalized at various levels to cover purchase of all computer equipment when purchase is appropriate, to permit maximum multiyear leasing by the government or to cover purchases where agencies have insufficient funds, the team's report stated.

Congress could also make its appropriations to agencies more flexible so that they could choose between the purchase or lease of equipment, depending on which option provided the "best buy."

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AT&T, Nasa Display Technology

Picturephone, Map System Wow D.C. Viewers

By Edith Holmes
CW Washington Bureau

WASHINGTON, D.C. — Buck Rogers should have been here. That moon-walking cartoon character from the 1930s would have enjoyed two recent displays of advanced technology long in the works but little applied as yet.

The National Aeronautics and Space Administration (Nasa) and the Bureau of the Census teamed up in mid-June to provide White House and Congressional decision makers with a broad range of domestic information in colored map form. Based on an atmospheric and oceanic system developed at Nasa and running on a Digital Equipment Corp. PDP-11/70, the demonstration even drew President Carter out of the Oval Office for a half-hour's visit.

At the same time and just a few blocks away, AT&T offered its Picturephone meeting service to an investment and financial consulting firm interested in sponsoring a public discussion of the House Communications Subcommittee's proposed rewrite of the Communications Act of 1934. Visual conversations took place among panelists in the Capitol city and clients of Drexel, Burnham & Lambert, Inc. in New York, Chicago and San Francisco.

Nasa and Census organized and aired their program on Capitol Hill and in White House offices at the request of Richard Harden, special assistant to the President for information management. The White House hopes to stimulate interest in creating a "data switch" through which all the statistics collected by the federal government can go with the end of supporting policy-making, according to Harden's assistant, Edward K. Zimmerman.

Mapmaking Process

Zimmerman used the Nasa system to draw maps of the nation, various states and particular counties and to color those maps based on such census information as population, education, labor, families, housing, electric bills, manufacturing and hospitals.

A policy analyst looking for the relationship between manufacturing and employment in North Carolina, for example, could obtain a colored map detailing the distribution of manufacturing in the state. He could then ask for a map showing the percentage of employment across North Carolina. Finally, he could request a map showing the state's distribution of those employed in manufacturing, Zimmerman explained.

Such a system could help analysts determine and decision makers visualize demographic and socioeconomic trends in the U.S. Ultimately, this kind of technology would lead to better decisions on behalf of the nation, the White House official said.

In addition to the PDP-11/70 at Nasa's Goddard Space Flight Center in Greenbelt, Md., the "domestic information display demonstration" was supported by an alphanumeric terminal connected to the computer system with a data line; a high-resolution, 19-inch color video monitor also linked to Nasa via video, microwave and cable; a 4-foot-by-6-foot screen that displayed the information contained on the monitor; and audio communications with Nasa.

All told, the system cost Nasa and Census, which provided 256 data items at the county level and 443 data items at the Census tract level, approximately $100,000. The bill for the communications facilities alone was $40,000.

An operational system might cost in the neighborhood of $5 million, Zimmerman estimated. It would consist of a center with a small number of terminals and the responsibility for maintaining the data base and two or three distributed facilities complete with terminals supported by minicomputers capable of data and video storage.

By storing the geographic information at the remote user sites, the cost of video transmission would go down, he added. In order to get the high resolution needed for the video portion of the demonstration, Nasa had to use three 13-MHz lines — one each for red, blue, and green, thus driving up communications costs.

All of the equipment used for the system's demonstrations on Capitol Hill and at the White House is commercially available, Zimmerman noted. "Nasa told me that had anyone asked, it could have put this same show on 10 years ago," he said.

Nasa has agreed to continue the demonstration for selected viewers over the next 30 to 60 days, and Census will work to form a consortium of interested federal agencies to pursue the concept of a central data switch, Zimmerman said.

Gathering at AT&T

Meanwhile, at AT&T offices here, Harry Edelson of Drexel, Burnham & Lambert gathered together John Tracy of the U.S. Independent Telephone Association, Herbert N. Jasper of the Ad Hoc Committee for Competitive Telecommunications, A.G.W. (Jack) Biddle of the Computer & Communications Industry Association, Vico Henriques of the Computer and Busi-

(Continued on Page 10)

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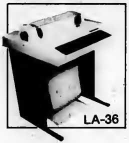

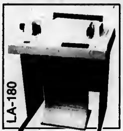

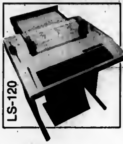

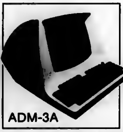

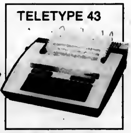

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IEEE to Award Piore Prize To Eckert and Mauchly

WASHINGTON, D.C. — J. Presper Eckert and John W. Mauchly will receive the Emanuel R. Piore Award at Compcon Fall '78 for achievement in the field of information processing and for contributing to the advancement of science and the betterment of society.

The award will be presented by Dr. C. Lester Hogan, executive vice-president of the Institute of Electrical and Electronics Engineers (IEEE), at Compcon's plenary session.

The Emanuel R. Piore Award was established in 1976 through an agreement between IBM and the IEEE Foundation, Inc. The award for outstanding achievement in the field of information processing consists of a bronze medal, certificate, $2,000 and a $2,500 international travel grant.

The award may be made each year to an individual or team of two individuals who have contributed significantly to the advancement of the science of information processing, which pertains to the fields of electrical and electronics engineering in relation with computer sciences, and to the betterment of society, the IEEE explained.

Compcon Fall '78 will be held at the Capital Hilton Hotel here Sept. 5-8 and is being sponsored by the IEEE Computer Society.

This year's theme is "Computer Communications Networks, Computers and Communications: Interfaces and Interactions."

Three preconference tutorials will also be presented: "A Survey of Software and Validation Methods"; "Computer Networks"; and "A Practical View of Computer Communication Protocols."

For more information, write to Compcon Fall '78, P.O. Box 639-A, Silver Spring, Md. 20901.

AT&T, Nasa Put on Shows For Washington Audiences

(Continued from Page 9)

ness Equipment Manufacturers Association, John Eger of Lamb, Halleck & Keats and Chuck Jackson of the House Communications Subcommittee to discuss the Congressional effort to bring the communications law in line with today's technology and marketplace [CW, June 19].

While AT&T provided the communications system and conference rooms in all of the participating cities, no Bell representative joined the panel to express the corporation's opinion of the draft legislation.

Picturephone's voice-activated cameras swiveled to focus on each of the panelists as they praised the House subcommittee for its efforts and privately observed that the audience in San Francisco looked more awake than the people in Chicago.

Edelson suggested that the passage of the rewrite as it now stands would make the Justice Department antitrust suit against AT&T moot since the law would restructure the industry, the end sought by the government in the massive case.

Biddle saw the House subcommittee's proposed law as a clear sign to Wall Street and the investment community at large that Congress is deeply committed to competition. He predicted an increased flow of funds to innovative companies in the communications field, leading to more competition while the debate over the new communications act goes on.

All of the panelists eagerly await the hearings on H.R. 13015, scheduled to begin sometime after Congress' July 4 recess. Congressional intent, they agreed, needs to be clarified throughout the proposed legislation.

In particular, the section of the draft law that would permit common carriers to engage in enterprises "incidental" to communications, provided they do so through separate subsidiaries, caused some of the panelists problems. They fear this clause would allow AT&T, for example, to own a DP subsidiary and to support it through the financial strength of its monopoly base.

Eger suggested, however, that while this may indeed be a "carrot" from AT&T's viewpoint, the proposed communications act contains "sticks" for the corporation as well. Among these is the divestiture of Western Electric Co., AT&T's manufacturing arm. The draft law will cause AT&T to rethink its entire structure, the Washington attorney maintained.

Most of the panelists expressed the belief that this legislation will be debated for anywhere from two to four years and that it may not be passed as a single package. On behalf of the bill's cosponsors, Representatives Lionel Van Deerlin (D-Calif.), and Louis Frey Jr. (R-Fla.), Jackson stated that the Congressmen will fight to keep the rewrite of the Communications Act of 1934 one law.

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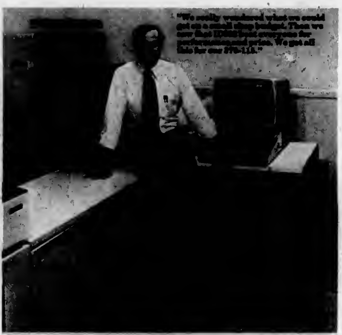
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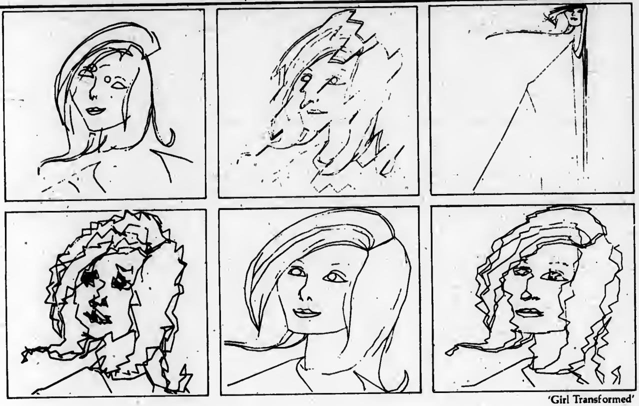


'Girl Transformed'

Artist Explores Controlled Randomness

'Bikini Shifted'

By Marcia Blumenthal
CW Staff

TORONTO — "I don't think any exciting, worthwhile or really different artwork has come out of a computer yet, including what I've done," Leslie Mezei said in a recent interview.

In fact, Mezei, an associate professor of computer science at the University of Toronto, said he hasn't been doing much artwork for quite a while — that is, until a few weeks ago, when he began a new project.

"Until now," Mezei said, "people have been taking individual images and randomizing and transforming them, but to be able to build a more complex thing like 'op art' — well, there haven't been any systems to do that." Some of Mezei's transformations are shown on these pages.

Mezei's latest project will build on an existing graphics system developed by the university's Dynamic Graphics Group. The system will be designed so that it can quickly produce multiples of modules.

For example, suppose an artist wants to repeat a heart-shaped drawing on a 30 by 30 grid, in effect producing 900 images which the artist wants to manipulate in various ways. Rather than going about this task employing "technical types" — terms used to describe his fellow computer scientists — Mezei has contracted with Burton Kramer, the artist who designed the Canadian Broadcasting Corp.'s logo.

Mezei chose Kramer because he does things that look like computer art, but with the subtle and complex variations Mezei would like to build into a computer system.

Mezei's Dynamic Graphics Group is a research unit partly financed by the university and partly by other grants endowed by the National Research Council and the Canada Council. Mezei and Ron Baecker, who Mezei said produced the first interactive animation system, are the principals of the group.

The group presently has equipment which, according to Mezei, produces data graphics, sketchings, animation and line drawings with output on color and black-and-white videotape and film. The output can be enhanced by a music synthesizer.

The group uses a Digital Equipment Corp. PDP-11/45 with the Unix software system from Bell Telephone Systems and programs in language "C."

Mezei, who has no art background, is excited about the prospect of using an artist to create the system. He plans to include Kramer in all the software design sessions.

"We are going to sit him down and do something and he will tell us what he likes and what more he would like the system to do," Mezei said.

The Hungarian-born reluctant artist studied mathematics and physics at McGill University. He became fascinated with computers while he was working at an insurance company, when he also had several friends who were artists.

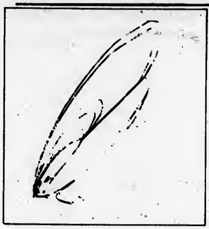
Somehow the idea of doing art with a computer intrigued him and, in 1963, he became an academician in order to pursue his interest in the new art form.

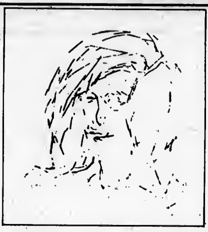
Not Satisfied

But, Mezei is not totally satisfied with computer art *or* the ivory tower these days. He complained that nothing really new and interesting is happening with computer art and criticized university computer science departments for not teaching the broader concepts of the information sciences.

North Americans have a bias against knowledge, tending to overemphasize the pragmatic; Europeans become fascinated with theory, neglecting the practical, Mezei contended. What is needed is a blend of the practical and theoretical, he claimed.

The only difference between the art produced today and the art produced in the early 1960s, he said, is that today's computers are interactive and can do in a couple of months





what previously took more than a year to do. But Mezei was quick to point out that there is no art coming out of a computer today that couldn't be produced by hand.

When Mezei did "Bikini Shifted," shown here, he didn't have an interactive system. Working from what he called a rather ordinary picture of a girl in a bikini, Mezei painstakingly took each point on the drawing and coded it along the X and Y coordinates, resulting in 600 points stored in the computer.

By taking each individual line segment and shifting it by a controlled random amount along a horizontal axis, the Picasso-like picture emerged. Mezei is proud of this drawing, which was used as an advertisement in the *London Times* for Lawrence Durrell's novel, *Numguam.*

What is interesting about the drawing is the transformation, explained Mezei, who added that Picasso, working without computers or mathematics, foresaw the artistic possibilities in the transformations which are now being done with computers.

Although Mezei is dissatisfied with the state of computer art today, he will not give up on the art form. "Most computer applications are somewhat incestuous — that is, they help computer science and other sciences, but I think the arts are very important to help us cope with our world."

Becoming less serious, he added, "Besides, it's fun and different."

Mezei believes computer art will remain fairly stagnant until a new breed of artists who are a blend of artist and programmer emerges with a new vision of the art form.

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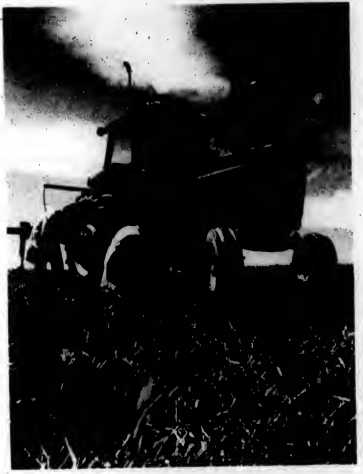

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In Four Languages

"Since WISE is literally a worldwide system, it cuts across barriers of language, distance and culture," adds G.T. Underwood, manager of Deere's corporate engineering standards department. "Our master list of terminology is already in four languages: English, French, German and Spanish and all dimensions are in metric and English. WISE has greatly enhanced our worldwide standardization efforts. Also our engineers around the world can readily access design specifications, application information, cost, vendor lists and the like."

"WISE was the first element of a corporate parts data base," says Larry Moore, administrator of engineering information in Deere's corporate engineering standards department. "Now it has links to other business systems in the company, supporting applications in such areas as service parts, warranty service, and parts catalog publications.

"Currently there are about 50 CRT (cathode ray tube) and 100 computer output microfiche display stations in 20 design centers in the U.S., Europe, Argentina, Australia and South Africa. CRT's access our IBM System/370 complex in Moline through the same telephone lines that carry our voice communication.

"The engineer can search the data base by attribute, such as the size or pressure rating of a hydraulic cylinder. In effect, he describes a desired part to the system and automatically receives back a listing of all Deere parts which fit the description.

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Here, telemetry devices transmit experimental data to a mobile laboratory. Similar advanced technology is reflected in Deere's worldwide data base of thousands of components, letting engineers utilize existing parts when developing new products.

Levi Sportswear: Handle with Speed

Levi Strauss & Company, known for its jeans, is today one of the world's largest suppliers of other fashions as well. Its Sportswear Division can ship as many as 180,000 garments a day from a new divisional distribution center in Little Rock, Arkansas. The highly automated facility controls a total of 44,000 stock-keeping units.

Panatela, David Hunter, and Wildfire

"We run physical distribution as if our Panatela, David Hunter and Wildfire sportswear were perishable merchandise," says James Benson, national distribution manager for the division. "We have to be there with the proper styles, in time to meet what customers are buying. Sales lost to stock outages can never be regained. Our operating goal is to ship every order within 24 hours of receiving it, and we are meeting that objective."

An IBM System/370 Model 145 computer keeps a digital "image" of all storage space in the 425,000-square-foot distribution center, and maintains a record of the inventory in each location. As cartons of garments are received from the factory, the labels are read by a laser scanner and the computer assigns them to storage locations.

When sales orders are entered, the System/370 generates picking tickets for customer shipments, which are passed to the control computer, an IBM System/7. This machine monitors the conveyor system through sensors, and controls the movement of goods by actuating track switches, diverters and conveyor motors.

"The System/370 stores the dimensions of folded garments and calculates the proper-sized packing carton," Benson explains. "Order fillers pack the cartons, each is automatically sealed, a laser scanner reads the label, and the control computer diverts it to the right conveyor track for the selected carrier.

"The payoff is service," Benson adds. "When customers phone, we can query the system through a terminal and tell them the exact status of an order. For Levi Strauss Sportswear, physical distribution is not just a cost to be minimized; we believe it should provide a benefit to the company and to the customer. With the help of our IBM computers, we are meeting that goal."

Packing for shipment (center) is the only manual handling of garments in the Levi Strauss Sportswear distribution center. Laser scanners (right) read labels so a computer can direct cartons through the conveyor system.

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Proposed State Food Stamp System Disputed

By Marguerite Zientara
CW Staff

MONTPELIER, Vt. — A proposed computerized state welfare program here — expected to serve as a prototype for other states — is meeting opposition from a group that considers its application to the food stamp program "harassment" of recipients.

Early last month, the Vermont Department of Social Welfare received a $1.9-million federal grant enabling it to integrate its five welfare programs in the department's 12 district offices within two years. Besides food stamps, the program will cover Aid to Families with Dependent Children (AFDC), General Assistance, Medicaid and Aid to the Aged, Blind and Disabled.

The goal of the system will be automatic eligibility determination of prospective welfare clients for any of the five programs, according to David Wilson, commissioner of social welfare. "After two years, the sophistication of our automation will far exceed that of any other state in the country," Wilson predicted.

The system is expected to cut case workers' paperwork loads and allow them to better relate to their clients' problems on a "person-to-person" basis, Wilson said.

The department's present system runs in batch mode on an IBM 370/145 belonging to the state. All programming is done in Montpelier and information is transferred among offices by mail, Wilson said.

Eligibility determinations take about two weeks with the present system, he said. The client gives information to a caseworker who fills out a form to be typed later at that office. The typed form is sent to Montpelier for programming and then "we must go back through the process for any determination," Wilson said.

The proposed system calls for computer terminals to be installed in all distict offices and in departmental headquarters in Montpelier. The system is expected to improve services for clients and eliminate bookkeeping errors resulting in under- and overpsyments, Wilson said.

Other applications of the automated system will include budget monitoring; development of research, training and evaluation programs; and monthly client reporting by mail for redetermination of eligibility for programs. With the present system, eligibility is determined every six months.

Reporting System Attacked

It is the monthly reporting system that offends the Bread and Law Task Force, a low-income advocacy group concerned primarily with monitoring all federal food programs affecting low-income citizens.

"Federal law prohibits state administering agencies from developing regular reporting systems, and in order for the Vermont Department of Social Welfare to include the food stamp program in the computer system with monthly reporting, it will have to get a waiver from the U.S. Department of Agriculture (USDA)," according to task force director Peter Ryersbach.

Law Aimed at Harassment

The purpose of the federal law, according to Ryersbach, is to prevent states from "harassing" food stamp clients by requiring them to make monthly trips to welfare offices.

Ryersbach said that while the Vermont system will not necessitate actual office visits, "it will be very difficult for people to have to fill out a form on a monthly basis and send it back to the Welfare Department, since a high percentage of Vermont food stamp recipients are illiterate."

Wilson plans to recruit the support of the Department of Health, Education and Welfare (HEW) in Washington in applying for such a waiver. "It will certainly be helpful to have HEW on our side; HEW wants the waiver as badly as we do," he said.

"We think that monthly reporting, if done properly, is a really positive step in welfare administration," Wilson said. "It makes the system much more accountable to the client and vice versa.

"According to virtually every study we've seen of participants in various programs — food stamps or Medicaid, for example — during any six-month period with any given client, there are likely to be significant changes in status that would either increase or decrease benefits," Wilson said.

Ryersbach wrote the USDA "three or four months ago" about the matter and was told the department was too busy to consider the matter at that time. He plans to write again soon and also plans to contact Vermont state senators and representatives in a bid for support against the monthly reporting system.

"It comes down to the fact that the department thinks what it's doing is right and I think it is wrong," Ryersbach said. "I have no objection to the department's upgrading its computer system, but we'll be doing everything we can to prevent food stamps from becoming part of that system."

Concerning the transition between the present and new systems, Tom Carey, monthly reporting project director, said, "We plan on involving recipients at an early stage of the project.

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Shared System Eases Libraries' Fiscal Crunches

By Tim Scannell
CW Staff

NORTH HAVEN, Conn. — Four independent public libraries hampered by circulation problems and "existing local fiscal crunches" have put a minicomputer in charge of the flow of nearly 600,000 volumes of literature.

The North Haven Memorial Library joined with libraries located in the nearby towns of Cheshire, Hamden and West Haven to purchase a circulation control system to facilitate library cooperation and promote resource sharing, according to Robert Martin, director of library services at North Haven.

"We all felt that because of the size of each of the libraries — all medium-scale — it would be better to combine our financial resources rather than acquire separate systems," Martin said.

The system allows a patron using the Connecticard, a statewide interlibrary card, to locate a title in any one of the four participating libraries' collections. Once located, the material can be reserved for the patron by direct communications via terminal with the system. The literature is then delivered to the requesting library within 24 hours by Connecticar, the statewide interlibrary delivery system.

The project, Library Exchange Aids Patrons, (Leap) was initiated when problems of inventory and circulation control mushroomed under the manual system, which involved handling "cumbersome paper files," Martin recalled. If a book was listed in the catalog but wasn't on the shelf, members of the staff "would go through thousands of cards to find out just when the book would be returned."

Keeping track of notices sent to patrons for overdue books and the corresponding fines was also a problem because of the tremendous backlog of paperwork at each library — especially the North Haven branch. "We ran anywhere from one month to five or six months behind mailings because each one had to be manually typed and checked out," Martin noted.

Feasibility Study

Representatives from each of the libraries, along with librarians from eight other small Connecticut libraries, conducted a study on the feasibility of implementing an automated circulation system. The study showed such a system could keep costs within each library's budgetary limits, vastly improve circulation control and provide instant access to the combined collections of all participating branches.

After carefully evaluating all of the available automated circulation systems, officials from each of the libraries decided to purchase the Libs 100 turnkey system form CLSI. That system was selected because it appeared to be the answer "to all of our circulation problems . . . and it has been used in large library clusters serving populations of 40,000 to 50,000 people or more for more than two years," Martin said.

The system, classified as a Model 14, is driven by a Digital Equipment Corp. PDP-11/04 minicomputer with 24K of memory located at the Hamden branch. On-line terminals are located at each library and entries into the system are made via keyboards and light-pens.

Resources Quadrupled

Linking each of the libraries has quadrupled the amount of information available, to the patrons, Martin observed. "In a medium- or small-sized library, it's difficult to maintain an extensive subject collection" because of budgetary restrictions. The ability to access all four libraries' collections eliminates the need to duplicate materials which are not routinely requested; the funds used to support those duplicate materials now supplement the libraries' other collections.

Members of the libraries even went as far as to enter into a "legal, interlocal agreement" to ensure that equality and fairness are practiced in the borrowing and lending procedures. "We have set up a board of directors to determine if and when there is an abuse of the system," Martin said, "although I don't foresee or anticipate the possibility of any such misuse."

The Connecticut library system already has a procedure whereby branches are reimbursed for services extended outside the town's limits. "If out-of-town people borrow more books from, say, North Haven then local people borrow from an out-of-town library, then we're compensated for our services by the state," Martin explained.

Although the system has only been in operation since December, the libraries have already decided to expand it. "We are adding ports and a larger storage bank," Martin said.

Eventually, he added, the library directors hope to have stations available at secondary school libraries so students can search directly in the combined data base for a title in the tri-town collection.

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Disease-Diagnosing System Expected Within Five Years

By Ann Dooley
CW Staff

PITTSBURGH, Pa. — Within two to five years, physicians anywhere in the country may be able to access a data bank of information to help diagnose and treat their patients.

That system is still being designed and refined by two professors at the University of Pittsburgh here.

In a clinical environment, a physician will be able to enter information on a patient's medical history and physical examination into a terminal at his office: The information will be sent to a central computer, which will store the information in a data base and generate questions about that patient for the physician's consideration.

In the course of asking the questions, the system will indicate to the physician what diagnoses it is considering and how the answers to the questions will help reach a final decision.

After obtaining as much data as is necessary, the system will provide a diagnosis of the patient's problems.

About 350 Diseases Covered

Dr. Jack Myers and Dr. Harry Pople, who have developed the system, call it Internist because it deals only with diseases pertaining to internal medicine, the broadest and largest medical specialty.

The data in the system is based on two types of information, diseases and their manifestations, and covers approximately 350 diseases and 2,800 manifestations, Myers said.

"Each disease entry has an associated list of manifestations known to occur in that disease, along with an estimate on a scale of 1 to 5 of the frequency of occurrence," Myers said.

The opposite is also recorded: "Each manifestation is associated with a list of diseases in which the manifestation is known to occur with a weighing factor on a 0 to 5 scale intended to reflect the strength of the association."

The system was designed to use a hierarchy of disease categories, organized primarily around the concept of organ systems. Categories at the top level include "heart disease," "lung disease" and "liver disease."

Not Substitute

Internist was not designed to take over the role of the physician, but rather to be an aid to him, according to Myers. Its task is one of problem formulation, not problem solving.

The system is really a simulation of the mental processes of a physician in analyzing a difficult case, Myers explained. "It generates and tests hypotheses, much as a clinician would formulate a model as a basis for clinical problem solving," Pople added.

The system is programmed to inform the doctor what data it is disregarding for the moment and on what it intends to focus. As the diagnosis proceeds, the system questions the physician about other observations and additional lab tests before making a final decision.

"One of the most important things we've taught the machine is to deal with the least costly things first," Myers said. "That not only means dollars expended for laboratory use by the patient, but cost also defined as physical pain and danger to the patient."

Once the system is operational, it will be tested in the University of Pittsburgh medical center and then expanded to other medical centers.

Linked to West Coast

Internist uses the Sumex-Aim computer facility at Stanford University, which has been developed to provide a national shared computer system for medical research concentrating on the application of artificial intelligence to medicine.

The Internist program will utilize Sumex-Aim's Digital Equipment Corp. dual-processor Decsystem-10, KI10 system using a Tymnet link by Tymshare, Inc. and Texas Instrument, Inc.'s TI-700 hard-copy terminals.

Doctors Jack Myers (left) and Harry Pople of the University of Pittsburgh discuss hypothetical medical problem posed to their Internist diagnostic system.

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The Care And Feeding Of Consultants

By Steven A. Epner

Consultants are a valuable resource, but they are also a rare breed of animal that needs special care and handling if you want to get Results. And results are the only reason any sane person would hire one.

Consultants serve three useful purposes:

- A consultant can offer a special skill or experience that is usually impractical for a firm to keep on staff.
- A consultant can supplement current staff. There are many cases where projects must be done, but there are no personnel available to do them. Sometimes, because of turnover or recent expansion, interim people are required until corporate staff can be built.
- Finally, there are certain situations where an uninvolved third party is the only way to get results. One good example is the performance of a special study which must be done without the pressures of internal corporate politics, headcount restrictions or timing.

Once you've decided you have a good reason to use a consultant, how you go about selecting one? You first must find candidates.

One of the best ways is to get a name from an associate who has had a good experience. Word of mouth can also help identify possibilities. In October, the Independent Computer Consultants Association is scheduled to publish a directory of consulting services.

What should you look for next? To begin with, you want to deal with a thriving concern. As with any large group of people, you will always find top-notch, dedicated professionals and fly-by-night operators.

In our specific industry you find a number of people become consultants "between jobs."This gives the industry a black eye and the using company a bad experience. It also makes it harder for the next independent to be able to get a contract.

We must remember, however, that in any situation there are extremes. A company always has the option of going to the very largest of consulting firms. You can deal with the Big 8 accounting firms or such giants as McDonnell Douglas Automation.

With these companies you are always assured a firm will stay in business, it will complete the work; and it is going to be expensive.

When dealing with a smaller consulting firm, a user can expect a lower rate, which is a factor offsetting the added business risk of dealing with such a firm.

From my own point of view, this is an extremely worthwhile trade-off. From a business standpoint, you will get more work done for your dollar and, very possibly, better work.

A $10,000 to $15,000 job may represent a drop in the bucket to some of the larger firms. To make it worthwhile, it may even be used as a "trainee project."

On the other hand, for an independent consultant, $15,000 may represent one-third of his annual income. In consideration of this, the user gets the attention and responsiveness that is not only deserved, but required in order to have a successful project.

That is not to say large companies do not do a good job on small contracts or small companies are unable to perform large projects. As a matter of fact, through ICCA, small companies band together to create project teams with the required expertise to accomplish large tasks.

The next thing to do is to check references. Recognize that no consultant is going to give you the name of a bad reference. You are not calling to find out whether the consultant is able to complete a contract, but rather to understand how he works.

When a company brings in a consultant, it is important to find an individual or firm which will work with you, support your organization and deliver results. Call a former client and ask questions about how the consultant worked, what type of work he did, where his expertise was. Find out whether he would be compatible with your firm. Find out how well he would fit in.

What can you expect once you have contracted with a consultant? All of your expectations should be summed up into one word: Professionalism.

Where written proposals are required, expect them to be delivered on time. A good proposal will be structured and address the problem definition; scope of the project; "deliverable items"; proposed work schedule; fees and billing; and, where required, professional resumes.

You should expect a written status report on a regular basis. This should describe what has been done, whether it is on time, any changes to the project (schedule, cost or content) and plans for the next period.

The next element I call "security and privacy." This extends beyond the obvious consideration of company confidential information. One of a corporation's most valuable resources is its people. You can expect that the consultant will neither offer employment or actively solicit personnel from the company.

By the same token, the consultant expects the company to respect his investment in personnel

In any company, the consultant can be expected to work within the organizational structure. He should be expected to follow all documented standards and procedures. In most cases, the consultant is expected to fit into the normal operation.

I strongly urge a company that does not have standards or procedures to consider their development. Personally, I feel much more comfortable, and much more able to satisfy clients, if I know what they expect. When entering a shop without documented standards, I always suggest the initiation of a project to develop them *before* starting any major development work. A well structured system development life cycle supports and enhances system development efforts.

The ICCA strongly advises its members to maintain a simple set of standards which can be attached to their contracts in those cases where standards do not exist and a project to develop them is not initiated.

Successful consultants by their very nature are self-motivated and self-managed. You should not have to spend overhead managing activities of an outside consultant.

The major exception to this rule, occurs in the case of contract programming or design, where consultants are used to supplement existing staff. Here the outside contractor becomes part of the corporate team and is treated and managed as if he were an employee.

Unless a contract is being completed off-site or at unusual hours, the consultant can be expected to be at the client location during normal business hours. In the case of staff supplements, those contractors can be expected to work the full business day. There is nothing that builds resentment more in an organization than an outside contractor who is the last to arrive in the morning and the first to leave in the afternoon.

But remember, the consultant is also in business, and with proper notification he must have the flexibility to use a limited number of business hours to maintain his business. Don't forget that after the end of the contract, you too, may require an extra hour or so of support.

A consultant can also be expected to maintain a "no surprise environment." Corporate project management can expect to be informed immediately of all deviations from the project plan as well as all completed tasks.

It is normally a good idea to review status with the consultant prior to any meetings. There is never any excuse to be embarrassed by unexpected information at a status meeting.

Finally, the most important thing to expect from the consultant is results. Consultants must be result-oriented to be successful. They must deliver what is required.

There are also side benefits to be gained from using consultants. One of the most important is the interaction with the current staff.

A good consultant is always willing to take small amounts of time to help with other problems that may exist. He has many experiences which can be related to the company's employees. The intangible benefits associated with this free training are tremendous.

Client Responsibilities

There is a second side to this story. To be truly successful, there are certain things that the consultant can expect from the business. These almost seem obvious, but it is surprising how few people actually take care of them.

The first — and the hardest for most businesses to provide — is a concise definition of the problem. Many times the request is something to the effect of "Can you help me?" Without better definition, many consultants are willing to say yes, then wing it from there.

Given a good definition of what has to be accomplished, both the consultants and the client can measure performance on the project. There is never any question whether progress is being made, because everybody understands what is to be completed.

If a definition does not exist, then the project should be developed in two stages. The first stage is to contract (either on a fixed cost or time and material basis) to define the problem. This is so important that without it I personally would turn down the contract.

It is too easy to fail. If you do not know where you are going, it is impossible to get there.

The next most important thing — and this applies equally well to internal

(Continued on Page 20)

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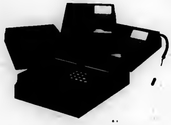

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IN DEPTH

(Continued from Page 19)

projects as to those being done by consultants — is to define acceptance. How many times have DP projects been considered failures because they were never finished? Especially for a fixed cost contract, it is imperative to be able to measure where you are and to be able to define completion.

My own company manages projects by "deliverable items." By defining a project in terms of specific, well defined, deliverable items, we have an absolute measurement of progress.

By prior definition, when all the deliverables are completed and accepted by the client, the project is finished.

Contract Coverage

Finally a contract or letter of understanding should be written defining the above two. In cases where something more detailed is necessary, the ICCA has developed a standard consulting contract. It covers:

1. Services. The services to be performed are defined and any standards or procedures which are to be followed are attached to the contracts. The more complete this definition, the more chance there is of having a successful project.
2. Rate of payment. How much is to be paid and when it is to be paid is specifically defined.
3. Reimbursement for expenses. Any reimbursable expenses and the requirements for receipts and documentation are detailed.
4. Invoicing. Who will send the invoices and to whom checks are to be made out are outlined.
5. Confidential information. This is a standard statement agreeing to respect

ICCA

The Independent Computer Consultants Association (ICCA) was formed by a small group of independent consultants to provide group-type benefits. As word of its existence spread, the group grew until incorporation was necessary.

The association was incorporated as a not-for-profit professional organization under the laws of the State of Missouri.

ICCA is dedicated to assisting independents and small businesses. Its chartered purposes are to provide its members with group-type benefits, to promote professionalism among its members and to increase the awareness in the general business community of the independent products and services available.

It also publishes a quarterly newsletter to alert its members to changes in business outlook, law and accounting practices as they affect small businesses.

Membership is open to any individual, partnership or company which provides a computer-related product or service. The organization can be reached at P.O. Box 27412, St. Louis, Mo. 63141.

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the confidentiality of information gained while at a client location.

6. Employees. There are two sections here. One notes that the consultant and the consultant's employees or subcontractors not to be deemed employees of the client; in the second, each party agrees to respect the others' employees as to soliciting or offering jobs.

7. Use of product. Who owns the materials, the code (if created) and documentation associated with the project are defined in advance, as are any restrictions on its use.

8. Client representative. The one person within the client organization who is given the authority to make decisions affecting the completion or alteration of the contract is identified.

9. Liability. There is standard and specific wording which should be used in this section. Any additional warranties are spelled out.

10. Complete agreement. Here it is stated that the contract or letter of understanding is the complete agreement and specifically excludes any statements made or implied which are not documented within the contract.

11. Applicable law. The contract should state it is "construed in accordance with the laws of the state" in which the consultant lives.

12. Scope of agreement. In our standard contract, this is some legal mumbo jumbo that says, in effect, that a court can reduce the scope of the contract if necessary to conform to the law.

13. Additional work. This specifies how the contract can be amended to add work not originally contracted for or envisioned.

14. Notices. This provides an address for the client and the consultant where notices can be sent.

15. Assignment. This statement relates to whether the project can or cannot be assigned by either party.

Steven A. Epner is president of The User Group, Inc., a St. Louis consulting company dedicated to assisting end users in making the most effective use of their computing facilities.

Epner is also the current president of the Independent Computer Consultants Association.

Recently, Epner's Law, otherwise known as the Oops — Ordinary Oversights Postpone Systems — Factor, has been used at conferences to illustrate the problems associated with lack of communication between end users and the DP staff. It is only through mutual understanding and communication that a reputation for successful projects can be established, Epner believes.

The author is a computer science graduate of Purdue University. He has been involved in all phases of DP from operations through the design and implementation of on-line data base applications.

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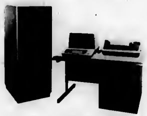

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Editorial

How Widespread a Problem?

Is a computer crime law really necessary?

Lawmakers in Washington recently heard industry experts and crime experts alike debate the pros and cons of a so-called computer crime bill. That proposed law, introduced by Sen. Abraham Ribicoff (D-Conn.), would make a large number of computer abuses felonies punishable by up to 15 years in prison and/or up to $50,000 in fines.

Rihicoff even said he would support a provision that would make failure to report a computer crime a criminal offense.

At the hearings, senators were warned that computer-related crime and computer abuse are increasing and that they could become synonymous with massive fraud, organized crime, physical and mental hardship, violations of intellectual property, terrorist attacks, hoaxes and geographically independent fraud [CW, July 10].

Computerworld has been hearing this story for years, yet the number of cases that come to our attention and that we report are few and far between. Is this because not very many criminals are using computers to commit offenses or that the companies and government agencies as well — including the Federal Reserve Bank — are concealing the crimes that do occur?

It's easy to see why they might not be reporting such incidents. As banks and other financial institutions move into full on-line banking services and electronic funds transfer, for example, they have a financial stake in keeping their images of stability and reliability untarnished. Other kinds of businesses — from local department stores to travel and entertainment card companies — also seek to avoid bad publicity.

CW is interested in hearing about unreported cases of computer abuse that may have occurred in your organization and here's your chance to tell us anonymously.

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What happened? ____________________

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Were assets of more than one organization or person involved?

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Was the incident reported to police? ____________________

____

Were charges pressed/dropped? Why? ____________________

____

Were the individuals involved disciplined in any way or discharged?

____

About how much money or equipment/time was involved?

____

How does your organization deal with crime in general? Did it treat this incident the same way? ____________________

____

Letters to the Editor

Salary Report Misleading

I read with interest "Analyst Salaries at All-Time High" [CW, July 3]. However, I think the article is terribly misleading in that it implied that systems analysts are earning more today than ever before, which is not the case.

For example, the article stated that the median salary for analysts in 1959 was $9,786, while it was $18,749 in 1974 (for an increase of 91%). During the same period, salaries for wharf and dock builders rose 205%, those for laborers 200% and those for roofers 191%. Compared with 16 other groups, analysts only did better than judges, whose salaries rose only 78% during this same period.

The inflation rate from 1972 to 1978 stands at 44.3%. Since analysts made $16,739 in 1971, they would need to make $24,154 in 1978 just to stay even, a difference of only $632 from the median 1978 salary of $24,786.

However, this analysis does not take into account the effects of our federal and most state tax schemes — that is, as inflation drives salaries up, taxpayers have had to pay an increasing percentage of their wages in taxes. While I do not have the actual tax figures in front of me, I am convinced that if this analysis were carried out, it would show that analysts have actually lost money, perhaps quite a bit, over the time period covered in the article.

Dennis L. Metrick
Philadelphia, Pa.

Kling's Comments 'On Target'

Notwithstanding the rodomontade of letter-writers Bezdek and Walden [CW, July 3], Prof. Rob Kling was entirely on target with his comments regarding the complexity and intensity of DP applications in local government vis-a-vis private enterprise [CW, June 19].

Local governments exist in a chaotic environment of constant change brought about by forces not within their control. Even as private enterprise is deluged by governmental regulations, local government faces an even more complex maze of programs and regulation changes each time the Congress or state legislature convenes and the regulations accompanying each change are promulgated.

Most of the expensive programs cannot be changed at local option.

Proposition 13, unfortunately for all its good intentions, attacks only the symptoms rather than the primary cause of the acute pain in the pocketbook being felt by taxpayers around the nation; and as a result, it will likely provide little more than temporary relief.

It would indeed be a shame if in the course of administering the temporary palliative, the local DP departments — which have been one of the few forces for increased productivity — are reduced to being yet another expense with no concomitant benefit.

People have for many years called upon government to operate in a more "businesslike" fashion, and yet there are very few businesses with revenues approaching those of many cities and counties that would dare consider cutting DP budgets — which are, in most cases, 5 to 10 times higher as a percentage of revenues than their government counterparts.

William C. Manuel
Nashua, N.H.

Computerworld welcomes comments from its readers. Preference will be given to typed, double-spaced letters of 150 words or less. Letters should be addressed to: Editor, Computerworld, 797 Washington St., Newton, Mass. 02160.

Data Past

Five Years Ago
July 18, 1973

WHITE PLAINS, N.Y. — IBM announced the System/3 Model 15, which boasted more main memory and more disk space than the current System/3 models along with a communications and multiprocessing capability. The system was built around the architecture of the existing System/3 models and retained the 1.52-microsec processor cycle time as well as the same basic instructions and languages.

— — —

WASHINGTON, D.C. — A study prepared by Compata, Inc., a consulting firm, concluded that a virtual storage capability could be added to the IBM 360 line by independent suppliers but such a move could result in system degradation.

Eight Years Ago
July 22, 1970

WASHINGTON, D.C. — The Federal Communications Commission, in a major statement designed to foster the growth of special service common carriers, said those carriers "would help meet the increasing need for diverse and flexible means for satisfying and expanding specialized communications requirements."

The statement gave commission support to the type of data communications services proposed by Microwave Communications, Inc., Data Transmission Co. and others who filed applications to offer communications services to data users in direct competition with existing common carriers such as AT&T.

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The Human Connection

This Country Needs a Good $5,000 Machine

By Jack Stone
Special to CW

Sometimes, in my desperation, I feel the micro-based, small (less than $5,000) business system industry is a fantasy. Other times, it appears to me to be a cruel hoax playing upon the unwitting businessman.

But at all times, I believe the allegation that the industry is in its infancy is a gross overstatement. From my vantage point, it's still struggling to leave the womb. Here's the latest on my quest for a micro system to install aboard my 54-foot yacht so that I can lay claim to the world's first floating, all-computerized, management consultant's office [CW, June 12].

After months of exploration, I finally became seriously interested in a product offered by a firm with the somewhat rococo name of Georgetown Computer Emporium, Inc., located in the heart of the Georgetown restaurant/disco district on the second floor of a low-slung building. (The first floor is occupied by the El Caribe restaurant; when a northwest breeze moves down M Street, the Emporium's computer demonstration facility is swirling with delightful smells of *poello*-in-process.)

The machine is a 32K, mini-floppy-disk-oriented, CRT, keyboard, printer affair, with word processing, small business and operating system software. Talk about a multivendor installation! Each of the aforesaid items is supplied by a separate vendor! I told the salesman/systems programmer/president that I kind of liked what I saw but I wanted to look further.

Through happenstance, I noted an article in *Mini-Micro* which gave a comparison among 11 vendors of small business systems. I entered all of their codes on the "bingo" card, but to date I have only received one response and that from Seals Electronics of Knoxville, Tenn. It included a spec sheet on the 8KSC-Z card which I could read but couldn't understand, plus a faded component price schedule which I couldn't read, except for the column headings referring to quantity purchases and the last sentence which said something about prices subject to change without notice. No help there, so ...

I turned to the expert consulting assistance of the Yellow Pages and contacted local firms. Most had systems at the $10,000 level up. But there were a few in my price range.

'Slight Mistake'

The salesmen at the Computer Workshop offered a 16K jobbie for only $4,300, but couldn't demo it because of a bad board. He called back a few weeks later to say it was ready, but that he had made a slight mistake on the price. I actually needed 24K to run the software and the new price was $5,300. When I asked if the warranty would extend to a marine environment, he became irate and berated me for trying to return rusted out micro boards. Moving right along. . . .

The rep at Quantum Research said he would send some literature to me about his machine which met my objectives and even included maxifloppies. Two weeks and no letter. I telephoned and a very young child answered with a quiet "Hello."

"Is your daddy there?"

"What do you want him for?"

"I want to buy a computer from him."

"He's not here."

I left a message, received no response and called back a few days later. The phone rang and rang, but no answer. And away we go . . .

Systems Engineering Enterprises was sort of interesting. It was proud of its complete line of computer conglomerations, but its word processing editor was line-number-oriented a la Basic and couldn't hold a candle to a cursor-oriented editor. On my way out to the staircase (another second-story operation), I saw a door marked "Computer Bargains" which I ignored, figuring it was S.E.E.'s outlet for the hobbyists.

I even called Portia Isaacson's Micro Store, deep in the heart of Texas. (She's the high priestess of the personal computer). The salesman said she is now with Electronic Data Systems. That told me something. He also knocked the Emporium's configuration.

I finally gave up, called the Emporium, said I would take the machine and asked when I could have it. The rep figured I could pick it up the following Friday, to give him time to "burn it in."

I began to get excited, at long last, so I organized an unveiling party for the machine. I invited 70 of my closest friends to join me on my cruiser the day the system was to be ready.

But when I arrived on M street with my certified check for $5,815.98, I burned up: the machine wasn't fully "burned in"! Seems the 32K-based business programs were all twisted up inside as they kept reaching out for 48K and the word processor program drove the printer at all of 25% of rated speed.

When I moaned that my guests were arriving in two hours and I really didn't want to demo an electronic garbage can, the salesman consoled me by saying, "Don't worry! Show'em Star Trek!"

I responded by saying that I changed my mind because I didn't like the robin's-egg-blue motif.

It was a great party. I set up a second har on the dock to accommodate the overflow. Curiously, after the party was over, I didn't recall anyone asking me why I didn't show off my new computer.

Reader Commentary

New Documentation Aids Should Show Data Flow

By Joseph T. Rigo
Special to CW

Life is easy when IBM announces a major new product line. We can see the problem clearly. We know that we are going to have to learn about the new line and everything we knew yesterday is obsolete. After that, it's just work.

The real fun in this business is keeping up with the sneaky little changes. These are the ones that infiltrate over a long period of time with no formal announcement. We just happen to notice one day that there has been a shift in emphasis.

For example, it seems the program logic flowchart has just about disappeared entirely as a documentation tool.

A programmer may still sketch a rough flowchart on the back of an envelope while thinking through a design problem. And the flowchart continues to be a basic tool in training students who are new to the field.

Still, it has been a long time since I have seen a neat, carefully drawn logic flowchart in anyone's documentation package. System charts, yes; but not for individual programs.

The program narrative may be another casualty of the times. It never was very popular, except with the standards committee. Programmers might write a few comments in a "notes" paragraph at the beginning of a listing, but they resisted any involvement with extended prose.

Hipo Charts Also Going

Hipo charts may also belong to the past. They had a brief moment in the sun, but never caught on, despite strong backing from IBM.

It may be that Hipo charts were a transition phenomenon. They attempted to deal with the problems of the program logic flowcharts and they placed greater emphasis on data flow, but they did not go far enough.

These days, we track data items, transaction codes and record types. We sketch data flow diagrams that look like something seen through a microscope. We study dozens of bacteria-like elements that scurry around various processing blocks.

The trend, if there really is one,

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The Taylor Report

Method Helps User Cope With Unfair Contracts

By Alan Taylor
Special to CW

For years, one of the problems of computer procurement has been that the contract forms are preprinted and not very open to serious change. True, nowadays some companies can get a few important things changed — but many firms cannot.

And even those that are able to make some changes usually find that for every provision they manage to have deleted, there is an unwanted stipulation left in.

But what then? What do you do when you want the hardware or software but the contract is really unsatisfactory? Put your head in the sand like an ostrich and hope? Update your resume and move?

Legal Review

One way that has never worked, as far as I know, is to send the contract over to the legal department. The moment you have said that you want the equipment and that these are the best terms you have been able to get, the response of the legal group is unhelpful: "Go ahead — but don't blame us." And that is — to date — the most constructive result I have seen.

But now a new approach has emerged. It has never been practiced, as far as I can find, having sprung from the mind of a lawyer who had to face one of these ostrich-philosophy contracts that didn't work out.

When he had at last convinced himself that his client wasn't the foolish nincompoop that he appeared to be (that took some time) and that he really had negotiated as well as the circumstances would allow, Mr. X decided that a response of "Don't do it" would be less than adequate.

Searching around for a solution, he decided not so much to reject the contract, but instead to reply, in writing, that it was unfair. He then went on to define the problems and the type of records the business should keep in order to minimize the problems if they ever arose and to show who was responsible for them.

The lawyer even went further than recommending that records be kept. He used the phrase "business records" or "records

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Documentation Aids Need New Orientation

(Continued from Page 23)

has been under way long enough. It may have started when IBM brought out its first operating system for the 360. The catch phrase at the time was "Everything is subroutine." There was no such thing as a main program anymore.

We never did make a big thing about documenting subroutines. We would list the input parameters and the output formats. We might show the main processing formula. It was assumed that anyone who wanted to know more would just study the code, which would only require a page or so.

In practice, of course, many installations went on producing "subroutines" of 6,000 lines or more. Now they have to replace these monsters, but no one remembers how they work.

The documentation people have to start by breaking the old program into subroutine-like blocks and tracking the data through them. It can be like watching a drunk stumble home. No one cares about the logic because much of it is based on obsolete hardware and software restrictions, and it will not be replaced.

I mention all of this because there seems to be some debate just now on whether the current flowchart standard is up to date. Chances are that it is not. The real question is whether it is worth the effort to make any changes.

Our need today is for better ways to document the data flow. The available tools are still primitive, and very little has been done to automate them.

Mainly, we need a wider variety of graphic techniques. The Yourdon organization and Chris Gane of Improved System Technologies, Inc. have done some nice work in this area, but their methods are far short of popular acceptance.

The automated tools are easily sabotaged when a data item name changes from program to program.

So, there is work to be done.

Rigo is president of Sysdoc, Inc. in New York.

Unfair Contracts Tackled

(Continued from Page 23)

kept in the normal course of business" to give them their proper description. For example, a description signed by your computer operator of what the software did when he entered a new date that happened to be for a new year rather than just for a new month may be able to be used in your local court, even if the operator has gone to Australia.

But that paper may only be used if it was drawn up in the normal course of business practice. If it was made for the purpose of preparing a case, then generally it simply isn't admissable without bringing the operator into court.

Now, normally, you are going to lose many employees in the course of using the hardware or the software, so it won't be easy to use them as witnesses. Hopefully, you are never going to have to prove a case. But in case you have to defend yourself against an unfair contract, the backup is prepared.

Types of Records Required

Under this approach, the user needs to do the following:

- Prepare a contract review, listing each item that is thought to be unfair — for example, a clause that excuses the vendor from negligence or a clause that gets the user to admit he has been able to inspect the hardware.
- List possible happenings under each unfair term of the contract which, under the contract, would be excused. For instance, under the negligence clause might be results from using an untested piece of software sent out as tested. Under the hardware inspection clause might be the possibility of a faulty connection or a dry joint that could be seen under a detailed engineering inspection.
- Prepare a set of reports designed to alert anyone who might see the result of any of these happenings to the value of writing down his observations immediately. The DP department needs to know what is going on.
- Set up a review period of the observations and reports — probably annually — to see that people are reporting what they should.

This approach at last provides an alternative to the ostrich attitude, which has until now been the only way to proceed. Users are getting alternatives nowadays, but still the contracts I have seen were written to protect the vendor and leave far too great a responsibility on the user.

Discuss this approach with your legal advisers before you sign that next contract and you should find the result helpful (they may even come up with some better answers to the problem).

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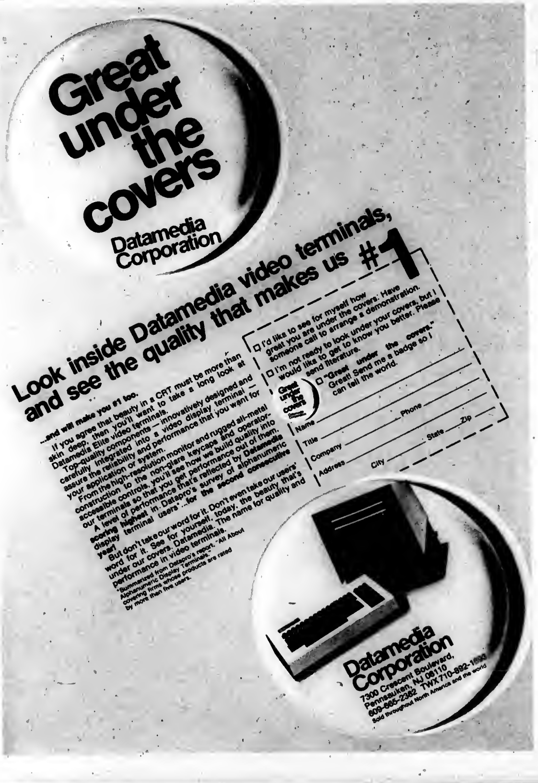

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Wang Software Adds DP to WP System

By Don Leavitt
CW Staff

LOWELL, Mass. — Software recently introduced by Wang Laboratories, Inc. not only bridges the gap between word processing (WP) and data processing, it creates a veritable highway between the two disciplines.

Some vendors previously augmented their DP offerings with text or word processing capabilities — Digital Equipment Corp. is one that comes to mind — but Wang's software links the disciplines in the opposite way. It provides users of Wang's larger WP systems with considerable, fundamental DP capabilities.

Among these capabilities are sort routine; three modes of mathematical computation and support for password-protected access and other security measures. Each of the facilities is separately priced, so users need only acquire those features they want, a spokesman noted.

Some other WP vendors — IBM, for one — have offered some of these facilities but, as far as the Wang spokesman could recall, until now no one has made them all available.

Sort Routine

Working with records and files closely akin to those used in DP, the sort routine can put a file in either ascending or descending sequence, based on a single key (perhaps part of a field), a field or multiple keys.

The machines are Ascii-oriented so the sort follows that collating sequence and the routine is limited to sorting on "just the first 25 characters" of a field, the spokesman said, "but that's usually enough."

Different field lengths are no problem; no padding is needed to make them equal length, he added.

Tests have shown that the larger Wang 25 and 30 can sort 1,000 records of 52 or 53 characters each in about 30 sec, whether the sort is alphabetical on name or numeric on a dollar amount, he continued.

The Math Support Package (MSP) allows users to call upon any one of three levels of arithmetic capability. In its most basic form, MSP performs simple addition and total checking.

In its second level, it provides arithmetic computations "across

(Continued on Page 28)

MVS Users Get '4Tune'

PHOENIX — Performance evaluators working in an IBM MVS environment have another tuning aid to consider: 4Tune from Capex Corp.

The package is said to provide reports, distribution diagrams and time plots for a variety of subsystems including TSO analysis, SVC analysis and Selected Event analysis.

The software's open-ended design enables systems programmers to identify performance degradation within any aspect of the system, according to a spokesman who cited Vtam, TSO, Vsam, JES or "any application or function that can be executed and balanced" as possible target areas of concern.

In addition, 4Tune brings several other features to MVS performance measurement. I/O device analysis at the CPU and channel path level and DASD volume analysis at the data set level are two such enhancements, he said.

The package can provide systems programmers with "highly accurate, analytical information" at the following levels: system, address space, control section and instructions within control sections.

The package costs $17,500 and can be ordered from 2613 N. Third St., P.O. Box 13529, Phoenix, Ariz. 85002.

Diligence Dissolves Disability

CHICAGO — John Melson is an application programmer at the Montgomery Ward DP facility here. Using the tools of his trade — Cobol, "some RPG," JCL, a program library maintenance system and its TSO interface — he writes, tests and debugs programs for the company's IBM 370/168.

What's so unusual about all that?

Nothing — except that Melson is blind and has been since long before he got into DP nearly 10 years ago. He joined Ward's staff last August and has been developing programs for catalog sales order processing.

Melson, 40, was blinded as a child when he was hit in one eye with a piece of glass. The damage in the injured eye affected the good eye, eventually causing total blindness.

Melson began preparing for a DP career in 1968. At the time he was an X-ray technician, developing film for Walther Memorial Hospital in Chicago. He described his decision to enter DP as "calculated."

John Melson, blind since childhood, checks some data on a printout.

"I knew a blind person would face an uphill fight breaking into the field, but I felt I was capable and I wanted to get into something more challenging. Most of all I wanted to work where I'd have the opportunity to use my head, as well as my hands. Of course," he added, "the potential for increased salary was also a consideration."

Melson attended several DP courses at the Med Comp Research Foundation in Cincinnati. Most study, however, was done on his own, using braille books and recordings.

Recording For The Blind, a New York-based, not-for-profit organization that provides learning aids for the blind, has been a particular help to Melson. As he received various books, manuals and brochures dealing with DP, he sent them to Recording For The Blind to be put on tape.

"Although I'm proficient at reading braille, recordings were much more practical for my use. The only problem I encountered in learning from the tapes was listening to readers who were unfamiliar with computer terminology."

After a great deal of study, Melson began his job search. "Just like anyone attempting to enter a professional field, finding the first job was hard for me," he recalled. "It's always easier to convince someone that you are capable of doing a job when you can say you've had experience elsewhere."

Melson had no idea just how hard finding that first job would be. The search lasted nearly 10

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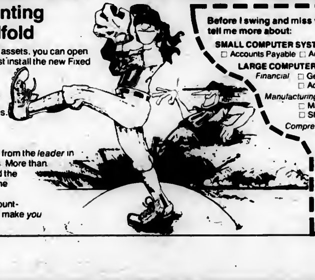

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Diligence by Programmer Makes Up for Disability

(Continued from Page 25)

months, until a reporter for the *Chicago Tribune* wrote an article about Melson and his struggle to find employment.

The article caught the eye of the late Matthew Danaher, then chief clerk of the Cook County Court. Knowing of an opening in the DP department of the court, Danaher called Melson and after talking to him, decided he deserved a chance. He hired Melson as a programmer trainee.

Melson quickly proved himself and was eventually assigned the task of writing, editing and updating programs that kept records and reports produced by the criminal court system in Chicago.

He left the court operation in 1974 to join Victor Comptometer, a Chicago-based firm that manufactures adding machines and cash registers. At Victor, Melson had his first exposure to Panvalet, the program library maintenance system from Pansophic Systems, Inc.

"My manager handed me a user's guide and a systems description manual and asked me to learn them. I sent the manuals to New York to be put on tape, and a few weeks later I was learning the system."

Melson was responsible for the maintenance of the payroll system — doing updates, editing and generating reports — using Panvalet in an IBM DOS batch processing environment. "When I made the switch to Ward's, I had to make a slight adjustment — going from DOS to OS. It wasn't difficult, though.

"The switch has worked out even better than I had hoped," Melson said. "My co-workers are very cooperative and always willing to help me, if and when I need it. Right now Ward's is even considering the purchase of a braille terminal for me."

When Melton gets an assignment, he discusses it with an analyst and uses a tape recorder to capture information he wants for later reference. To read printouts and other written material, he uses a device called an Optacon from Telesensory Systems, Inc.

When asked if he'd recommend a career in DP for other visually impaired people, Melson answered with a qualified "yes."

"Anyone considering entering DP should approach it with a commitment to hard work, determination and enthusiasm. Obviously, blind people attempting to enter the profession must approach the task with an even greater fervor."

Volunteers Needed

NEW YORK — Recording for the Blind is seeking volunteers with a good technical understanding of DP to serve as readers or editors of material recorded by others. The association has 29 recording facilities scattered across the U.S., a spokesman noted.

Recordings are generally made on request and may include textbooks for students or technically oriented materials, such as reference manuals or user guides, for people already in the work force.

The recordings are loaned to the users and returned when they are no longer needed. The association's operations are funded by contributions and government grants.

The association has studios in Washington, Miami, Detroit, Chicago, Denver, Phoenix, Los Angeles and San Francisco as well as here and in some smaller cities.

The work has to be done in an association facility, the spokesman said, because the reader and the editor function as a team.

"The pay is lousy but the satisfaction is great," the spokesman said, urging interested people to contact Jan Sneed, public relations officer, at the association's headquarters, 215 E. 58th St., New York, N.Y. 10022.

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Not So Mini Anymore — Part 2

Transaction Processing Easier to Do on a Mini

By Kenneth I. Cohen
Special to CW

Transaction processing by computer is, in a sense, a return to the "natural" way of processing data — one item at a time, as an event occurs; in other words, "doing it on-line." It reduces turnaround time, provides current and accurate information promptly when and where needed and reduces manual data handling.

The most widely used transaction-processing software is IBM's Customer Information Control System (CICS). It is a lot more than a simple transaction processor; it is also an extremely sophisticated, complex data communications monitor that can control a network of terminals and batch processing concurrently.

Consolidating regular communications interfaces, as well as I/O and control features, CICS is not a simple system to understand, often requiring large program management teams to design applications for it and use it efficiently with expensive mainframe resources.

When user demands for increased interactive/processing capabilities overtax mainframe abilities, DP managers have a viable alternative to the traditional choices of upgrading their existing systems or replacing them with new, more powerful systems. That alternative is the minicomputer-based system equipped with transaction-processing software.

Minicomputer-based transaction-processing software provides many of the same features without the complexity inherent in CICS. Such essential characteristics as screen form definition, terminal management, task management, multiterminal capability and utility programs are available in both mainframe and mini environments.

End-User Orientation

Transaction-processing mini packages provide capabilities similar to those found in today's small business computers designed for first-time users.

Focusing on the application programmer and the actual end user (the terminal operator), transaction processing on minicomputers offers such features as Cobol compatibility, interactive screen formatting, on-line screen testing, a multiprocessing environment and sophisticated data management systems.

A good transaction processor allows the terminal operator or programmer to design screens interactively without reference to the application program. Once a screen is defined and designed, the terminal operator tests the screen, again independent from the application program, using utilities supplied with the transaction processor.

Input Preedited

Time and effort are saved by input data validation features of mini transaction-processing packages. Basic editing is performed by shared, reentrant routines automatically invoked by the monitor, using the screen attributes assigned to each field.

When input data does not conform to the field definition, an error indication is returned to the terminal operator without the invocation of the Cobol application program, which only processes the data when it is "clean."

User-Transparent Communications

Terminal management is a function of any good transaction processor. Monitoring the complicated terminal housekeeping functions, the better mini software packages allow the programmer to be an applications programmer and not a communications programmer.

With these transaction-processing packages, application programmers simply issue a Cobol call to communicate with the terminal. There are neither restrictions imposed, nor special macros to learn. Cobol programmers write, test, debug and install on-line transaction-oriented programs with little or no difference from the procedures used for batch programs.

Management avoids high training costs and experiences higher productivity when Cobol programmers can concentrate on problem solving in their "native language," instead of learning new languages and new techniques.

Both mainframe and mini transaction-processing software are capable of controlling the execution of a series of on-line and batch applications. Task management functions performed by mini and mainframe packages are quite similar.

Having local and remote communications capabilities, these functions should be transparent to the Cobol application programmer. They must be completely integrated with Cobol, as should the necessary file access methods.

Naturally, security features necessary for the protection of files and integrity of data, such as record and file lockout facilities or password protection, are available to allow multiuser transaction processing and to limit terminal users access to specific data or applications.

Including comprehensive automatic error recovery routines and automatic message queueing for busy periods, mini software provides the user with mainframe convenience in a user-oriented, user-manageable package.

Integrated Systems

Mini manufacturers offer excellent transaction-processing climates. Many offer good tools with which that environment can be built. Some go a step farther, providing more sophisticated support, and others fashion all of the components into an integrated package whose components are transparent to programmer and end user alike.

Until now, most transaction-processing software for minicomputers was for 16-bit machines. Recently, Interdata announced a 32-bit transaction processing package; it's only a matter of time before others also offer 32-bit software aimed at the commercial user.

Cohen is product manager, commercial software, for Interdata.

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Packages Enhance HP Unit

PALO ALTO, Calif. — Two business-oriented applications packages unveiled by Hewlett-Packard Co. for users of its HP 9845 desktop computer were designed to facilitate planning activities in either project management or forecasting and graphics.

The Project Management package utilizes network analysis techniques such as CPM, Pert and MPM to aid in formulating basic plans, allocating key resources, anticipating problem areas and evaluating alternate planning decisions according to a spokesman

Features of the package include network and subnetworking techniques, project capacity, multiple sort keys, probability calculations and multicharacter descriptions he said

The Forecasting and Graphics software is said to be capable of analyzing and smoothing raw data to determine trends, seasonality and random variations.

The package can produce both graphics and numeric data using such forecasting methods as performance analysis, cost projections and sales prediction, the spokesman explained. It also incorporates finite differences, trend removal, seasonal corrections, moving averages, exponential smoothing and other statistical techniques.

Bar graphs and pie charts, can be produced to enhance management reports and presentations, the spokesman claimed.

The Project Management (Part No. 09845-11000) and the Forecasting (Part No. 09845-10510) packages are priced at $500 and $300, respectively, from HP at 1507 Page Mill Road, Palo Alto, Calif. 94304

Martin Signs With Deltak

SCHILLER PARK, Ill. — Noted DP author and lecturer James Martin has signed an agreement with Deltak, Inc. which will result in a "James Martin Advanced Technology" series of video-based but multimedia training courses.

Topics to be covered according to Dektak, will include distributed processing, data communications, computer networks, data base, interactive systems, "computer dialogs" (not otherwise defined) and management and user perspective.

The first of the series of courses — "Distributed Data Processing: A Management Revolution" — will be available in October, Deltak said from 9950 W. Lawrence Ave., Schiller Park, Ill. 60176.

Wang Blends WP and DP

(Continued from Page 25)

and within any 13 fields" in a document or record including crossfooting and batch balancing, the spokesman said.

At its most advanced level, the package supports 17 floating-point registers each 14 digits long. Users can read to registers, write from them, store data, perform various tests, execute complex mathematics and establish rounding algorithms and decimal extensions he continued

Wang has also added three types of security features to its larger systems. A standard password facility limits the documents that can be accessed from any particular workstation. An independent control feature enables supervisors to view, delete or alter passwords as required

A "data erase" feature assures that all data stored on system or archive disks is totally erased, Wang claimed.

All of the software runs on a Wang 20, 25 or 30 WP system. The sort routine (available now) and MSP (due in October) cost $1,000 each, while the security package (ready in August) costs $2,000.

Wang is at One Industrial Ave., Lowell, Mass. 01851.

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Package Runs as TSO Job

'Sysmon IV' Puts MVS Action On-Line

INDIANAPOLIS — The Sysmon IV package from Performance Systems is an on-line MVS monitor for problem and performance diagnoses and determination. It provides a dynamic and comprehensive view of system resource efficiencies.

The "now-time" monitor can be used by sites with single CPUs, multiprocessor or attached-processor configurations running under OS/VS2 Release 3.7 with Selectable Unit 7. It does not require but is compatible with RMF, a spokesman added.

Operating under TSO, it shows a number of measurements without having to wait for the post-processor stage, as was typically required with batch-oriented monitor packages of the past. System IPS in effect and processor and logical total channel utilization are two of the measures that can be displayed, he noted.

Demand paging, page faults, total system paging and swapping counts are also provided as are such statistics as page slot turnaround time by paged data set, unreferenced page interval counts and auxiliary storage manager queue lengths, he said.

The package is distributed in machine-readable object code but unlike most software products is licensed on a quarterly basis. The cost for the first CPU is $289 for the three-month period, the spokesman said.

Performance Systems can be reached through P.O. Box 44143, Indianapolis, Ind. 46204.

'Superwylbur' Backs 3270s

ROCKVILLE, Md. — Version 2.0 of the Superwylbur text editing system from Optimum Systems, Inc. includes both local and remote support for IBM 3270 CRT terminals.

The prime benefit to the 360/370 user is the joining of 3270 cursor-controlled editing with the features of Superwylbur; this allows nonconsecutive portions of text to be modified, a spokesman explained.

The package costs $25,000 from 5615 Fishers Lane, Rockville, Md. 20852.

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A DP Fantasy

The More Things Change, The More They . . .

By Martin Smith
Special to CW

I couldn't believe I was looking forward to coming back to the Kokomo plants. There is a magnetism about their huge old machines, ovens and boilers — the meshing of many generations of technologies to get a finished product out the door.

For all the electronic wizardry on the Coast, it is in these dusty old factories of the industrial Midwest that technology finds its real proving ground — installed, debugged and cursed until it, too, gathers dust and blends into the accepted past.

I remember the first microprocessor controls we put on the old air makeup house over there back in 1974. We've come a long way in the last 10 years.

That looks like the project engineer coming this way. "Hey, Tom, how are you and your fancy machines doing?"

"Well, what in the world brings you back to this forsaken spot, Jack? Haven't seen you for years."

"The Optical Logic Circuits User Group is meeting here this year. I was just thinking about the first system we worked on — you know . . ."

"The air makeup house, right?"

"Yep. It was really an uphill battle all the way. Bad power, bad cables, a Neanderthal plant engineer and your continuing feud with old what's-his-name — 'Blue Box Bill.' "

"Right on. The problems have gradually disappeared — largely through retirement — but new ones keep cropping up. But the real-time plant simulator has been running ever since you left, and it's changed a lot of old viewpoints. But Bill is still around."

"What's he up to these days?"

"I really don't know. I haven't seen him for months. Around 1977, you know, the company got on that security kick and locked all the DP guys inside their little corner of the world. I see him occasionally in the cafeteria."

"I really liked Bill, in a way, but we sure had our troubles. Always talking about wanting to control the process computers, but never taking the time to learn a thing about them. Wouldn't set foot in the production area, either. I always wonder what would have happened with those guys in DP if they had really become involved."

"I'm sure Bill would like to see you. Let's see if we can find him."

Eventually we got to the second floor of the administration building and, sure enough, there was the same black metal door to the DP room.

"Say, anybody know how to get in there?" Tom asked some clerks in the area. Before they could answer, the black door opened and a cart loaded with printouts emerged. Tom quickly grabbed the door and poked his head inside.

"Hey, Bill, you got a minute? There's an old friend out here to see you."

"Well hello, Jack. Boy, it really has been a while since you were here. Come on in and reminisce. Just sign the log and take a badge."

We talked about 15 minutes, and I finally got around to asking him what was really on my mind: "Tell me, Bill, what are you guys doing. in here these days?"

"We've been pretty busy. We recently installed a new sort package, and we've been through three operating system revisions and an equipment upgrade in the last year. Plus, we changed disks and our operating costs were kept to about their level of last year. We're working on a couple of new things, but the bulk of our time is in invoices, payroll and the like — and, of course, the material status reporting, which is our main processing load."

"It sounds like you still have things pretty well under control. I guess I'd better be getting along. Stop in to see me if you get to any of the Western plants."

As we left Bill's room and the black metal door slowly closed behind us, Tom looked like he was thinking the same thing that I was. "Isn't the material status a by-product of the real-time plant simulator?" I asked.

"You bet. As far as I know, it has been the official record for over a year."

"This is too much. Let's see what happens to that material status report."

We walked around to the material department and, sure enough, there was the DP clerk binding the massive listings.

"That's a pretty hefty load for a young girl like you," Tom said — still showing his "male chauvinist" side, as it was called when we worked together. "What do you do with these reports, anyway?"

"Well, I unbind the oldest, throw it away and bind the new one," she said somewhat curtly. "And I know your next question is whether anybody ever looks at this stuff, right?"

"Right. And I'll bet the answer is 'occasionally,' or possibly less frequently. Any chance that you could scrap the whole exercise and get rid of these old racks?"

"No way. You know, DP is still under Financial, and the controller seems to feel like this is the last visible remnant of his DP domain. We've just ordered new binders."

"Oh, yeah, I forgot about that. Thanks, we'll be seeing you later," Tom said as we walked away.

"Blows your mind, doesn't it? Say — I've got to run, but how about a beer after work?"

"Sounds good. I'll see you across the street at 5."

"See if Bill wants to come. He needs a drink more than either of us, whether he knows it or not!"

Martin Smith is a freelance writer and systems analyst from Detroit.

Ledger, Report System Moved to 8/32

ANDOVER, Mass. — The General Ledger and Financial Reporting System developed by Software International for large-scale CPUs has been adapted for use on Interdata 8/32 minicomputers, according to the software vendor.

The adaptation gives accounting and financial personnel a data base-oriented system that allows them to request, design and implement their own unique reports as well as work with a set of standardized reports built around the user's own chart of accounts, a spokesman said.

Accounting can establish its own pyramid of accounts and alter the organization as required. The system supports a roll-up and hierarchical versatility to perform dollar summarization in an umlimited number of directions, he claimed, adding that the system includes auditor-approved control techiques.

Cost Allocation

The system also includes automatic cost allocations, automatic accruals and reversals, fixed and variable budgeting, comparative reporting, product or cost center reporting, period accounting, graphics, forecasting and modeling, the spokesman said.

The Interdata implementation of the package costs $15,000, which includes support for installation, training and educational assistance, he said from Elm Sq., Andover, Mass. 01810.

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Mini Runs 'Express'

WESTON, Mass. — Express, a modular integrated system that performs a broad range of analysis, planning and modeling functions on IBM 360 and 370 CPUs, has been adapted to run on the Prime Computer, Inc. Model 400 minicomputer.

An on-line system to support management, Express enables marketing departments, for example, to make ad hoc analyses of existing data or financial managers to build corporate models to answer "what if" questions or to compare budget figures with "actuals."

The adaptation was made, according to the developers at Management Decision Systems (MDS), because few companies could afford a mainframe to exclusively run Express; the time-sharing implementation, still available on Tymshare's remote service, "has its limitations."

While MDS now offers a turnkey system incorporating a Prime mini and the Express software for $300,000 to $500,000, the software costs $150,000 to $210,000.

MDS is in Riverside Office Park, Weston, Mass. 02193.

For Public, Private Facilities

Telenet Offers Advanced Networking

By Ronald A. Frank
CW Staff

WASHINGTON, D.C. — Telenet Communications Corp. has announced an advanced multiple microprocessor network computer called the TP 4000 that will be used to upgrade the Telenet public packet network. In addition, the TP 4000 will be used to provide private packet networks to users desiring nonpublic transmission capabilities.

The TP 4000 can be configured as a concentrator, multiplexer front end, packet-switching nodal processor, contention switch or code/speed converter, depending on the user's requirements, according to a spokesman.

One of the key points for users configuring private packet additions to existing corporate networks is that the TP 4000 can be adapted to existing communications environments. This means the user can retain operating applications software, front ends and protocols and integrate them into the expanded network operation, a spokesman said.

The TP 4000 can handle up to 480 ports, either synchronous or asynchronous, and can include up to 512K bytes of addressable memory. This will soon be expanded to a maximum of 1M byte of directly addressable memory, a spokesman said. Initially, the TP 4000 will handle X.25 networks and within the next 18 months, an IBM Systems Network Architecture (SNA) capability will be added.

The private packet networks supplied by Telenet are compatible with most equipment and network architectures and were designed to serve as a common corporate network utility for all user locations and DP applications, according to the company.

The company's turnkey private networks support the X.25 protocol and can be linked to X.25-based public networks such as Telenet.

Telenet will reportedly supply a minicomputer-based network control center as part of its private network offering or give users the option of relying upon the netowrk control center facilities and staff of Telenet's public network.

The private network control center provides all of the capabilities built into Telenet's own public network control center. These capabilities include downline loading of software, centrally controlled remote diagnostics, continuous monitoring of network operational status and collection of statistical and accounting data.

First Installation Scheduled

Installation of the first private network node using the TP 4000 and a dedicated network control center is scheduled for mid-year at the British Post Office (BPO) in London. The Telenet-supplied system will be used to expand the range of data communications services offered by the BPO between the UK and the U.S.

(Continued on Page 36)

FCC Registration Plan Affects Users of Independent Modems

By Mickey Schenberg
Special to CW

DANBURY, Conn. — Users of independent modems are affected by the recently enacted equipment registration program of the Federal Communications Commission (FCC).

Until recently, such modems required a Bell Data Access Arrangement (DAA) for connection to the public switched network. Under the FCC registration program, effective since Oct. 17, users can now purchase independently made data couplers instead of leasing DAAs from the telephone company. Alternatively, FCC-registered modems may be purchased from independents for direct connection to the switched network.

There are, therefore, three options open to users with an existing inventory of independent dial-up modems: continue to lease DAAs from the telephone company; purchase registered protective circuits to replace the DAAs; or replace the existing modems and DAAs with registered units that require no protective coupler.

Users preferring the first option should know that starting in mid-1979, the supply of DAAs will gradually shrink, and this could hamper future network expansion. The diminishing DAA supply is a direct result of the FCC registration program and AT&T's apparent decision not to register the DAA.

'Grandfather' Provision

Under the registration program, Bell must submit its data sets and DAAs for FCC certification, just as the independents do. However, to permit orderly transition to the new program, there is a "grandfather" provision, which operates in two phases.

In the first phase, all units directly connected to the switched network before last Oct. 17 are immune from registration requirements for life.

In the second phase, all units of the same type as those already "grandfathered" can gain the same immunity if they are directly connected to the switched network before July 1, 1979.

Effectively, this program gives the phone companies more than 18 months to work off their old equipment inventory.

After July 1, 1979, only registered units and grandfathered devices can be directly connected to the switched network. By deciding not to register DAAs, therefore, AT&T limits their future population to the number used by the 1979 cutoff date. Grandfathered units can be disconnected, repaired and reconnected, but even so, the supply will slowly diminish through attrition.

Besides cramping future network expansion, the limited supply of DAAs could also delay changes in terminal locations because of procedures the telephone company uses in relocating DAAs. The original unit is disconnected and put into stock for overhaul, and a new, or reconditioned DAA is installed at the new location. After July 1, 1979, there will be no guarantee the telephone company will have a DAA to replace

(Continued on Page 36)

IBM 3270 Linked For 7-Ft Display

CAMBRIDGE, Mass. — A computer interface that enables an IBM 3270 series CRT to be connected to a modified Advent Videobeam 1000A projector has been introduced by Advent Corp. The interface permits the Videobeam projector to display on its 7-ft diagonal-measure screen the same image the IBM 3270 displays on its 14-in. diagonal-measure screen.

The Videobeam display, which allows a classroom-size audience to view the alphanumerics generated by the IBM terminal, is being installed in IBM regional data centers for use in customer presentations and training.

The interface provides a replica of the 3270 series terminal image in real time, and the display format on the 7-ft screen is 80 characters per line by 24 lines.

Systems comparable to Advent's reportedly range in price from $54,000 to $300,000. The Advent system will sell for less than $10,000, the firm said.

Advent Corp. is at 195 Albany St., Cambridge, Mass. 02139.

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COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Sycor Combines 445 Processor, Data Station 12

ANN ARBOR, Mich. — Sycor, Inc. has combined the 445 processor with the 576-character-screen Data Station 12.

The availability of Data Station 12 with the 445 processor creates an upward growth path for users of the earlier Sycor 440 systems, according to a spokesman.

With the 445, users have access to software systems as well as communications packages and system security programs that have been in use for several months. They can also use Cobol, Basic, or TAL II, Sycor's data entry language, the firm said.

Data Station 12 characters are formed with a 5 by 7 dot matrix and the display features three intensities. The station can be located up to 300 feet from the Sycor 445.

Two keyboard styles are available, offering either typewriter or keypunch design. Each is an integral part of the data station and includes a numeric pad, the firm said.

As many as eight Data Station 12s can be supported on a 445 system along with 64K bytes of main memory, a 5M-byte cartridge tape drive, up to 308M bytes of disk storage and up to eight printers.

Sycor's multitasking operating system permits each data station to be controlled by separate foreground programs. A concurrent batch-oriented job-like communications or batch print may be operating in the background. All tasks may be controlled by concurrent spooling facilities, Sycor said.

A typically configured 445 system incorporating four Data Station 12s, one Sprinter printer, a communication adapter, 5M bytes of disk memory, a 5M-byte cartridge tape drive and 64M bytes of main memory can be purchased for $44,780. Comparable monthly lease rates are $1,157, $1,065 and $975 for one, two and four years respectively, including maintenance.

Sycor's Data Station 12 will be available for customer delivery in September.

Sycor, Inc. is at 100 Phoenix Drive, Ann Arbor, Mich. 48104.

Plan Affects Modem Users

(Continued from Page 35)

the one it disconnects.

Instead of risking these delays and, in addition, paying the monthly lease charge of $2 to $8 for a DAA, users can buy registered couplers from independents for about $40 to $120. Since they are covered by the registration program, there is less fear of independent DAA equivalents becoming limited. However, because of the economics involved, independent suppliers are more likely to stress direct-connect modems than the versions that require a DAA or its equivalent, so the latter-type modem could be in short supply.

For users, the economics of converting to direct-connect modems are more complex. One factor is the investment made in the existing dial-up modems and how much depreciation has already been taken. Another is the price of the new modems. For speeds up to 1,200 bit/sec, direct-connect modems cost about $50 more than the earlier versions that require a DAA. At higher speeds, users generally pay no premium for the direct-connect types.

Depending upon the economic status of their installed units, users may choose to replace their DAAs immediately with independent couplers to avoid further lease payments — or, the conversion might be delayed until the network is expanded or reconfigured.

In evaluating the trade-off between DAA lease payments and the one-time charge for the independent coupler, users should remember that the latter option also calls for installation of a data jack by the telephone company. Typically, the jack carries a one-time installation charge of $12 to $35.

In next week's issue, Schenberg will describe the jacks and connection arrangements available under the FCC registration program.

The author is product manager at General Datacomm Industries, Inc., One Kennedy Ave., Danbury, Conn. 06810.

Telenet Unveils Network Gear

(Continued from Page 35)

Pilot network systems for two major U.S. corporations will also be installed during the third and fourth quarters of 1978. Both of these will utilize the X.25 protocol, the spokesman said.

The TP 4000 is available under tariff, lease or purchase options. Private networks will be available on a lease or purchase basis only. A typical TP 4000 used as a local terminal concentrator to control a network subsystem including 32 asynchronous ports and four synchronous ports supporting X.25 will cost about $28,850.

A TP 4000 configured for a small packet network including eight synchronous ports and 16 asynchronous ports will cost about $47,300.

A fully redundant larger packet net with 16 synchronous ports and 64 asynchronous ports with packet switching will cost about $120,200.

Telenet Communications Corp. is at Suite 850, 1050 17th St., N.W., Washington, D.C. 20036.

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We are entering the computer market with a range of sophisticated system-level products.

I think they are some of the most important breakthroughs ever in systems technology.

For us, this step is not only natural and logical, but inevitable.

We consider that we are finally giving birth after ten long years."

Charles E. Sporck
President

"I assure you, National Semiconductor did not caper into the computer market on a whim. For the past decade, we've been a leader in creating the technology that makes computers work.

In 1973, we became a visible systems supplier—with the sale of electronic point of sale systems. We're now the second largest supplier in the world. With more than 13,000 terminals and over 1000 computers in more than 1,400 store sites. And a full-time field service force of more than 250 people.

Three years ago, we introduced IBM 370-compatible add-on memory. Today, National ships more large scale 370 add-ons than anyone except IBM.

National has built add-in memories for some of the most popular minicomputer models as well.

We are now shipping our industry standard Series/80 microcomputers at the rate of 12,000 systems a year.

Two years ago, we unveiled our first IBM-compatible computer. To date, over 100 systems have been installed in ten

Older Terminals Replaced

Reliability Important for JPL Space Exploration

PASADENA, Calif. — Exploring the solar system with automated spacecraft is the task of the National Aeronautics and Space Administration's Jet Propulsion Laboratory (JPL) and, the success of each mission is largely dependent upon the reliability of a complex and sophisticated communications network.

JPL recently has added to that network several Harris Corp.1620 remote batch processing systems. The 1620s, which will replace existing '60s-vintage Univac 9300 terminals at the site, were selected for their compatibility with Univac's Nine Thousand Remote (NTR) protocol, multihost communications capability and line of available peripherals, according to spokesmen.

The 1620s will be used in the mission support areas for batch output from one of the three Univac 1108s in JPL's general-purpose computing facility (GPCF).

GPCF's DP requirements are accomplished by three Univac 1108s at the central computing site. An average of 300 time-critical and 3,000 nonreal-time jobs are processed daily by the CPUs.

Each 1108 has a primary function: the 1108A is dedicated to the Voyager mission, the 1108B is dedicated to the Viking Mars mission and the 1108C is for general-purpose use.

Most input to the 1108s comes from approximately 300 intelligent demand terminals at remote sites throughout the Laboratory. The demand terminals are used by mission planners, navigators, engineers, scientists and programmers for their interactive input to the 1108s. These individuals work on flight projects, energy, medical science and many different projects; all scientific disciplines are being explored at the laboratory.

Output to GPCF users is distributed to a series of remote job entry (RJE) terminals in the form of print, punch and plot data. The RJEs have been placed throughout the laboratory for the convenience of general-purpose users and personnel in the mission support areas.

Critical Operations

A typical transaction consists of entering certain data at one of the many demand terminals, then directing a print file from the 1108 to the most conveniently located RJE. The main objective at GPCF, therefore, is to bring the 1108s to the many users and put batch into their RJEs — to provide them with common locations to process their data.

Because the operation of some RJEs is critical, hardware reliability plays a large part in the routine of how things work. A good example is one of the RJEs dedicated to the Voyager project and located in the center of the operational area.

If that RJE goes down, a backup is required. This is usually accomplished by directing 1108 output to another RJE and hand-carrying the output to the user. This causes a time lag problem and creates the opportunity for a reliability failure.

JPL has replaced some of the existing Univac 9300 RJEs with the Harris 1620s. In addition to the reliability of the Harris equipment, the 1620 is one of the few terminals to offer compatibility with Univac's NTR protocol with full-duplex communications at line speeds up to 56k bit/sec, a JPL spokesman said.

The NTR emulator package offers many optional features not available with Univac's NTR terminals, such as a "hot" reader, operator console communications, dynamic assignment of data streams and character set selection by control card, he said.

The 1620 also is one of the only terminals available with a concurrent multihost communications capability. This enables the 1620s to communicate with any of GPCF's 1108s in either 1004 or NTR protocol, without time-consuming plugging and unplugging.

The 1620s eventually will be tied into the 1108A and the 1108C so a user can access either of those computers from his remote site. This would depend on where his files are located or to which computer he might be assigned if a line was blocked when the dual-host capability is required.

Link to 370 Set

JPL eventually will connect the Harris 1620s to an IBM 370/158 located on the California Institute of Technology campus, then later to a Control Data Corp. host.

Another basic requirement of the RJEs is the ability to print, plot, punch and read. The 1620's multiprogramming communications operating system, COS, enables the 1620 not only to communicate with multiple hosts simultaneously, but to schedule and assign its peripherals.

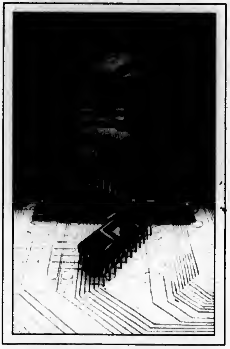
In addition to the many on-site users of the three 1108s, there are about 20 remote users as far away as Australia and Spain, where the Deep Space Network tracking stations continuously monitor spacecraft exploring the solar system. Most of these users' requirements are for processing their administrative and nonscientific data.

countries. We are now shipping more IBM-compatible computers than all other competitors combined.

I think this demonstrates that National Semiconductor has quietly, deliberately become a prime mover in computer hardware and systems. Annual computer revenues already put us in the top 15 of all U.S. general purpose computer manufacturers—and we're climbing. Certainly, we haven't come this far without being acutely aware of the market's needs.

A clear, levelheaded look.

If we had not penetrated the systems market of our own accord, technology would have eventually forced the business on us. Our semiconductor components are rapidly becoming total "systems on a chip."



But before jumping into the market altogether, we gave ourselves the luxury of a clear, levelheaded look at the terrain.

Because we have no equity in particular methodology or design, we remain free to appraise the market and develop a product that uniquely solves a problem.

And, by applying current semiconductor technology and production expertise, we deliver better performance at a lower price than other suppliers.

Just another computer?

National Semiconductor is deeply committed to applying its systems technology to real user problems. We are not interested in simply creating another different computer.

By making software-compatible hardware, we protect a customer's investment in standardized software.

At the same time, we consider it our responsibility to supply our customers with the latest in systems technology. So we'll be sparking unique product advances of our own. Particularly where a void exists in the marketplace.

For keeps.

National Semiconductor is in the computer systems business for keeps—as a broadbase supplier able to handle everything from manufacture through distribution, delivery, service and support. That's why we have an active, full-fledged service force of over 250 people set up to respond to customer needs.

We're willing to pinpoint our experience in research and development to further advance systems technology. In fact, over the next several months we'll be taking the wraps off some of the most significant new products in our history. Breakthrough products like the System/400, perhaps our most important advance in systems technology to date.

The System/400 is the first minicomputer designed to perform all the functions of large IBM computers. It means users will be able to run existing industry-standard software on a system at a fraction of the cost of a large computer.

If you'd like to know more about the future of National Semiconductor, Computer Products, or about System/400 specifically, write me personally: Charlie Sporck, President, National Semiconductor Corporation, Drawer 1, 2900 Semiconductor Drive, Santa Clara, California 95051."

Computer Products Group
National Semiconductor Corporation

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WUI Cuts Marisat Telex Rate, Adds Marigram

NEW YORK — Western Union International, Inc. (WUI) has reduced its Marisat Telex rate by 33%. WUI is a joint owner of Marisat, the world's first commercial maritime satellite communications system.

The cut reduces from $6 to $4 per minute the cost of Telex calls via satellite between ships at sea equipped for Marisat service and points in the U.S., including Hawaii, Puerto Rico and the U.S. Virgin Islands.

WUI has also established a low-cost message service known as Marigram available from Marisat-equipped ships at sea. With Marigram service, crew members and passengers are provided with message service to addresses located in the U.S., including Hawaii, Puerto Rico and the U.S. Virgin Islands.

This service costs $2.25 per message; the minimum charge for a telephone call via satellite from ships is $30, WUI said.

A Marigram message, consisting of a selection of any three of a large list of phrases, is transmited by a Marisat-equipped ship to WUI's automatic message computer system, Telus, where it is printed, addressed and mailed by priority mail.

WUI provides shipboard terminals for use with Marisat for lease or sale. WUI's shipboard satellite terminal is equipped with both a telephone and a teleprinter and operates in a gyroscopic-stabilized mode so the antenna is always "fixed" to the satellite despite the movement of the ship on the high seas.

WUI is at One WUI Plaza, New York, N.Y. 10004.

GE Extends Terminet Line With Diskette Storage Unit

WAYNESBORO, Va. — General Electric Co. has introduced the Terminet Diskette Storage Terminal (DST), which provides flexible disk storage for RS-232C-type CRTs, printers and modems.

The DST interfaces with GE teleprinters and asynchronous devices that transmit and receive Ascii code at 110-, 200-, 300- and 1,200 bit/sec, the company said. It can operate in half- or full-duplex mode.

Using a microprocessor-based design, the DST provides file management and on-site configuration. It can be field-upgraded from one to two disk drives by sliding the second drive into the chassis, a spokesman noted.

The DST is configured as an independent unit with two RS-232 ports, one for various peripherals including CRTs and printers and the second for a data set. The unit is compatible with the Bell 212A, 103 and 202 data sets, the spokesman said.

The storage medium is an IBM-compatible soft-sectored, single-sided flexible, magnetic diskette which has a usable storage capacity of 231,800 characters in a single unit to half a million characters in a dual unit.

Each diskette can accommodate variable-length files and can be edited, added to, sorted, searched and otherwise manipulated in an average access time of 463 msec, the vendor claimed.

The single-drive DST costs $2,500 and leases for $95/mo including maintenance on a one-year rental plan. GE is in Waynesboro, Va. 22980.

'So Much for the Smoke Test.'

The office of the future has just received its first electronic mail.

COMET — the computer message system that lets you compose, edit, send, receive, file, and retrieve virtually any type of intra-company correspondence.

COMET frees executives from the tyranny of the telephone. It cuts down on paper clutter. It helps make business communication simple, direct, and effective.

For details on the first electronic mail system designed to fit the way you work — and the way you'll be working tomorrow — attach your business card to this ad and send it to: Computer Corporation of America, Communication Technology Division, 575 Technology Square, Cambridge, MA 02139. 617-491-3670.

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Computer Advances

Vol. 3 No. 4 July/August 1978

Transpose a 2 megabyte matrix in 44 seconds—the F-Series minicomputer

HP plots: the HP 2647 and GRAPHICS/1000

How do you address a 2 megabyte mini?

Very easily.

The new F-Series computer is the top-of-the-line for the HP1000 family. Its design has been optimized to provide users with the high speed and accurate computation so needed in scientific, industrial, and engineering applications.

Fast processing

The F-Series capitalizes upon the successful HP1000's high performance architecture. Its CPU executes the base instruction set at an impressive one million instructions per second.

To further increase speed, we integrated a second processor devoted solely to floating point operations. Accurate to eleven decimal places, this new processor executes both single (32-bit) and extended (48-bit) precision floating point instructions at hardware speeds. A single precision floating point add, for example, executes in only 630 nanoseconds; and a multiply in 1.78 microseconds.

A new "Scientific Instruction Set" (SIS) calculates trigonometric and logarithmic functions with incredible speed and precision. With the hardware floating point processor as its resource, SIS typically executes a sine instruction in 47.6 microseconds.

Fast FORTRAN

Other operations essential to efficient FORTRAN are standard and included as an extension to the instruction set. There are fifteen microcoded routines such as parameter passing, and packing and normalizing functions that accelerate FORTRAN.

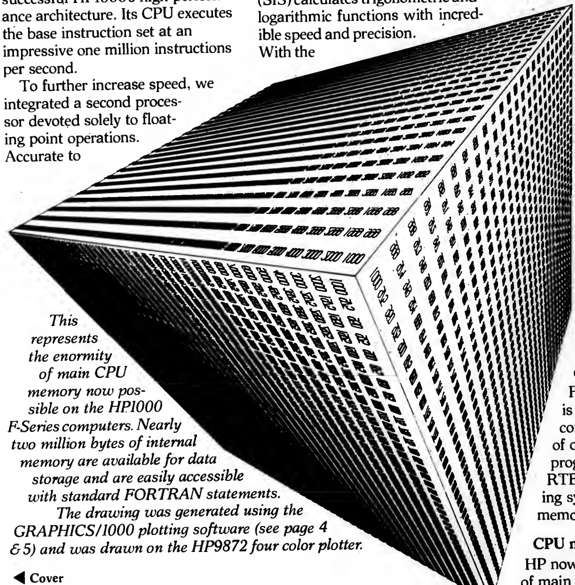
The cumulative effect of these new features is the exceptionally fast running of FORTRAN programs. Plus, the price is attractive for those OEM and end users who value cost effective solutions to computer aided design, graphics, simulation, modeling, and scientific problem solving applications. The F-Series starts at $12,250.*

RTE-IV extends the reach of your data

Further power in FORTRAN is available for all HP1000 computers with a new version of our multi-user, multiprogramming, disc based RTE-IV. This advanced operating system features a new memory management capability.

CPU megabyte-arrays

HP now has nearly 2 megabytes of main CPU memory available for data. A significant contribution of



This represents the enormity of main CPU memory now possible on the HP1000 F-Series computers. Nearly two million bytes of internal memory are available for data storage and are easily accessible with standard FORTRAN statements.

The drawing was generated using the GRAPHICS/1000 plotting software (see page 4 & 5) and was drawn on the HP9872 four color plotter.

◀ Cover
An artist's interpretation of the view from within a two megabyte data array.

RTE-IV is its ability to manage these large data arrays. Easily accessed with FORTRAN statements, there is no need of complex and slow virtual memory schemes, nor extensive recoding and segmentation of data.

For example, in just 44 seconds, the following few lines of standard FORTRAN transpose the two million byte matrix featured on the cover. This is a significant contribution for a 16-bit machine.

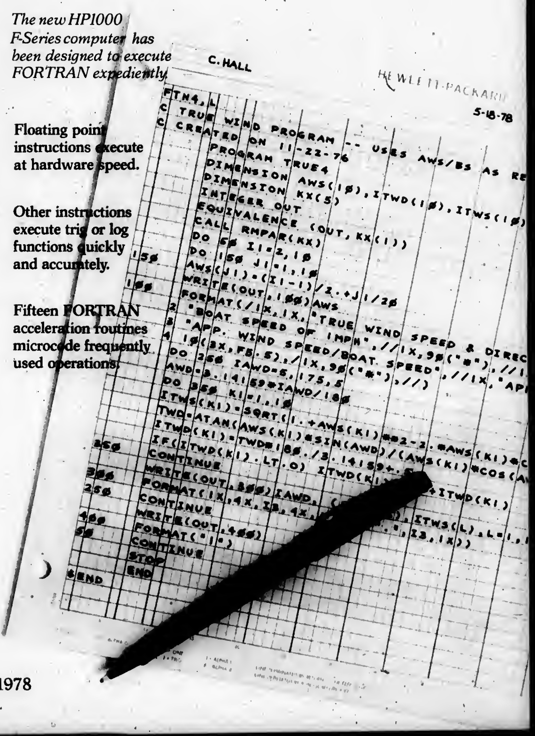
```
PROGRAM TRPOS
COMPLEX ARRAY, TEMP
COMMON/EMAC/ARRAY (500,500)
DO 10 I= 2,500
DO 10 J= 1,I-1
TEMP= ARRAY(I,J)
ARRAY(I,J)= ARRAY(J,I)
ARRAY(J,I)= TEMP
END
```

With RTE-IV, many programs may be in memory simultaneously in up to 64 partitions, and with up to 54K bytes of program space in each partition. These partitions, as well as I/O, may be simply configured at system start-up time without regeneration. And, should a parity error occur in a user area, that part of memory is removed from the available pool, but the system continues to operate. RTE-IV systems begin at $40,000*

3.1 cents a byte*

Since HP's early commitment to semiconductor memory (May, 1974), we have been able to bring customers decreases in memory price that average 30% a year, and memory board density that has grown from 16K to a dramatic 128K bytes per board. Memory in our E-Series is now just 3.1 cents per byte* The F-Series computer uses a 3.9 cents a byte* high performance version that has a cycle time of 350 nanoseconds. Our fault-control capability provides memory error correction and detection.

For more information on these new products, plus the full range of our HP1000 family, note A to C on the reply card.



```
FTN4,L
C  TRUE WIND PROGRAM -- USES AWS/BS AS RE
C  CREATED ON 11-22-76
      PROGRAM TRUE4
      DIMENSION AWS(10),ITWD(10),ITWS(10)
      DIMENSION KX(5)
      INTEGER OUT
      EQUIVALENCE (OUT,KX(1))
      CALL RMPAR(KX)
      DO 50 I1=2,10
      DO 150 J1=1,10
150   AWS(J1)=(I1-1)/2.+J1/20
      WRITE(OUT,100)AWS
100   FORMAT(/1X,1X,"TRUE WIND SPEED & DIREC
     2 "BOAT SPEED OF 1MPH",//1X,90("*"),//1
     3 "APP. WIND SPEED/BOAT SPEED",//1X,"AP
     4 10(3X,F5.5),/1X,90("*"),//)
      DO 250 IAWD=5,175,5
      AWD=3.14159*IAWD/180
      DO 350 KI=1,10
      ITWS(KI)=SQRT(1.+AWS(KI)**2-2.*AWS(KI)*C
      TWD=ATAN(AWS(KI)*SIN(AWD)/(AWS(KI)*COS(A
      ITWD(KI)=TWD*180./3.14159+.5
      IF(ITWD(KI).LT.0) ITWD(KI [illegible] +ITWD(KI)
350   CONTINUE
      WRITE(OUT,300)IAWD, [illegible] ),ITWS(L),L=1,1
300   FORMAT(1X,4X,I3,4X, [illegible] ",I3,1X))
250   CONTINUE
      WRITE(OUT,400)
400   FORMAT("1")
50    CONTINUE
      STOP
      END
$END
```

The new HP1000 F-Series computer has been designed to execute FORTRAN expediently.

Floating point instructions execute at hardware speed.

Other instructions execute trig or log functions quickly and accurately.

Fifteen FORTRAN acceleration routines microcode frequently used operations.

**U.S. prices only.*

Our pictures are worth a thousand numbers...

Computer graphics can play a key role in many phases of science, business, engineering, and management. Charts and graphs frequently make complex relationships much clearer than a table of numbers ever can.

By generating these graphics interactively, it is easier and faster for a user to interpret data and discern its trends. Similarly, computer graphics can facilitate the design process by accelerating the creation of complex drawings.

Recognizing the importance of computer graphics, Hewlett-Packard furthers its commitment to graphics support by introducing two new products: GRAPHICS/1000 plotting software and the HP2647 intelligent graphics terminal. These new products bring graphics to a wide range of users and applications.

The HP2647, programmable in BASIC, is a powerful graphics workstation which frees your CPU to perform large, complex tasks. Optimized for business graphics and data plotting, the HP2647 can even be used by those with little or no programming experience.

GRAPHICS/1000 utilizes the speed and power of the HP1000 computer system and enables you to input data and programmatically generate graphic output for complex scientific and engineering applications.

A unified graphics approach

Hewlett-Packard has developed a common graphics language based on a uniform set of fundamental graphics functions. So far, this language has been implemented on the HP1000 computer system, where the HP2648 graphics terminal may be used; the HP9845 desktop computer system; and the HP2647 intelligent graphics terminal.

Currently, their graphic output can be routed to the HP9872 four-color plotter and the HP7245 thermal plotter/printer, which are controlled using the common language commands. In the future, additional HP graphics devices will be supported with this same language.

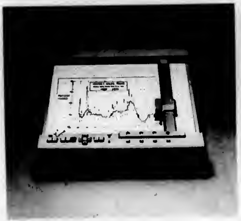
With GRAPHICS/1000, simple programs can convert tabular data into useful plots and charts. In the same way, interactive graphics techniques can aid design tasks by drawing mechanical parts, integrated circuits, electrical networks, and architectural designs.

GRAPHICS/1000 is a multilingual set of tools that enables you to design sophisticated programs for high level graphics on HP1000 computer systems. You can program in FORTRAN, BASIC, or Assembly languages, choosing the one that best suits your computing needs.

Your ability to produce graphics for instrumentation, computation, and operations management applications is enhanced by using GRAPHICS/1000. Input and output of information can now be accomplished pictorially.

A library of 55 graphic subroutines selects and initializes the operation of graphic devices, draws lines and text, reads cursor and digitizer positions, defines area and coordinates of plots, and draws and labels axes and grids. There

HP7245 thermal plotter/printer


HP9872 four color plotter

HP2648 graphics terminal

...with GRAPHICS/1000

are even error handling subroutines to help you quickly debug application programs. These subroutines can save a great deal of programming time in complicated graphics applications.

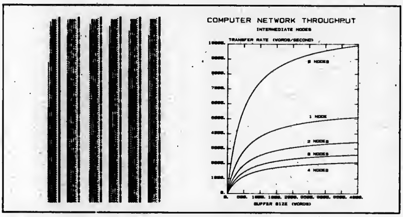
Program now, plot later

When programming with GRAPHICS/1000, you don't need to know in advance which output device will be used. Write your program to draw a picture and specify the aspect ratio (width/height) of your plot. When you run the program, select any supported HP graphics peripheral. GRAPHICS/1000 automatically scales and fits your plot onto the chosen graphics device.

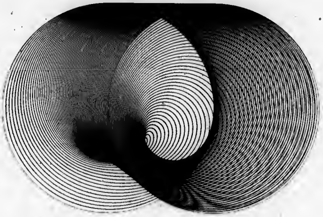
Since GRAPHICS/1000 is a continuing family of software, you can expand your graphics capabilities while minimizing your software investments. The first member of this family comes standard with the HP1000 Model 45, which includes the F-Series computer. Or GRAPHICS/1000 can be added to any HP1000 using RTE-M or RTE-IV operating systems for $500.*

For more information on GRAPHICS/1000, check D on your reply card.

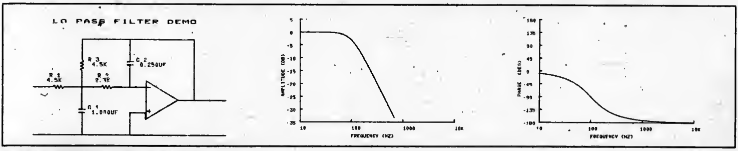
**U. S. prices only.*



NUMBERS TO PICTURES drawn on the HP9872 four color plotter

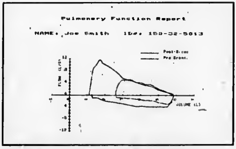


drawn on the HP9872 four color plotter



drawn on the HP7245 thermal plotter/printer

drawn on the HP2648 graphics terminal



drawn on the HP7245 thermal plotter/printer

These represent but a fraction of the range of graphic representations that can be produced with GRAPHICS/1000.

...with the HP 2647

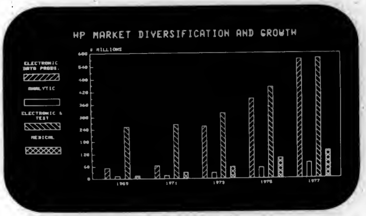
HP2647 intelligent graphics terminal

By combining BASIC programmability with raster scan technology, the HP2647 intelligent graphics terminal makes sophisticated graphics easy to use in a wide variety of applications. This intelligent terminal with local mass storage (dual integrated cartridge tapes) gives you a powerful graphics workstation. Total dependence on a CPU is gone. Graphics are yours where and when you need them.

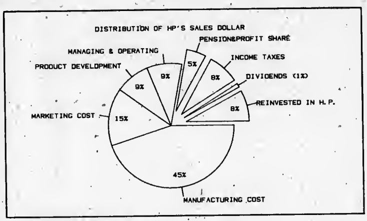
New graphics capability

Lists of tabular data, often overwhelming, can be put into perspective using "multiple automatic plotting" and HP's standard high level graphics commands.

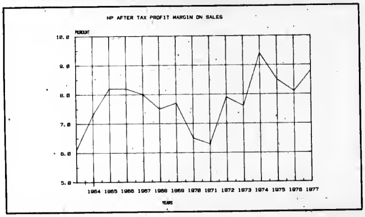
The predefined, multiple automatic plotting feature is easy to use. Just key in any tabular data. Then select from a displayed menu the type of chart or plot desired —



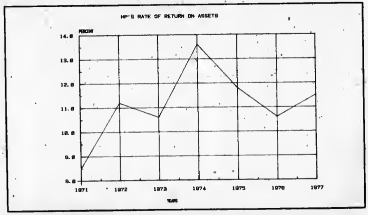
produced by the HP2647 intelligent graphics terminal



drawn on the HP9872 four color plotter



drawn on the HP9872 four color plotter



drawn on the HP9872 four color plotter

The HP2647 intelligent graphics terminal helps business managers to visualize their data.

NUMBERS TO PICTURES produced by the HP2647 intelligent graphics terminal bar, pie, x-y cartesian, or logarithmic. The terminal automatically labels, scales, and plots the data for you. No CPU software is required.

Suppose you want to create more intricate and specialized graphics. Simply use BASIC-like, high level graphics commands (PLOT, FRAME, AXES, MOVE, etc.) as you would any BASIC statement to draw, and label axes and grids; to control tic mark spacing, character size, and line types; to initialize the operation of different graphic devices; to plot data; to achieve a personalized, easy-to-understand graphic representation of your data.

What if you want a hard copy of your graphics? Multiple HP2647's can now share the same printer or plotter, significantly reducing the cost-per-terminal for hard copy output.

Useful as well as intelligent

Using the HP2647's powerful BASIC gives the terminal flexibility and versatility in a wide variety of computer environments.

Sometimes data from a "canned" CPU program needs to be tailored to your specific needs. A simple BASIC program can reformat or post-process that data. For example, sales data, is often listed on a monthly basis and stored in a central data base; however, you might want this data reformatted into three month averages. Using the HP2647's BASIC, you can easily do this.

Similarly, a BASIC program can pre-process or edit check the accuracy of data prior to transmission to the data base, eliminating most input errors.

Friendly front end processing

With an intelligent terminal like the HP2647, processing loads can now be shared effectively between terminal and main computer. Repetitive and simple tasks can be performed by the terminal with only results sent to the computer at the end of the day. Your CPU is free to perform complicated tasks utilizing its full power. Overall system efficiency is improved.

Outstanding graphics

The HP2647 has all the features you have come to expect from our graphics terminal family:

- Refreshed raster scan technology provides a continuously bright display even in well lit rooms.
- Selective erase, the ability to make graphic changes without redrawing the entire image, gives you rubber band line as well as other capabilities. Shade any portion of your drawing with one of the eight available patterns. If you don't like your choice, erase it and use your own design.
- The labels for eight user-definable soft keys appear along the bottom of your screen as a convenient reminder. Soft keys are used to control the flow of data between its source and destination, and can even simplify complex programs.

The HP2647's $8,300* price includes RS232 data communications, and up to 20K bytes of workspace.

If you would like more information or a live demonstration, indicate E on the reply card.

**U.S. prices only.*

The new HP2647 intelligent graphics terminal offers BASIC programmability, multiple automatic plotting, and a high level graphics language. A few lines of code produce complex, yet clear graphic representations.

Close in on distant data

Put data where you need it

In the spirit of distributed processing, information that is useful to an area can now be stored in a local data base. Then with remote data base access (RDBA), a remote HP3000 can "poll" these geographically distributed systems to gather data for summary reports. In the same way, remote data bases can be updated from the central site.

Data bases and applications can also be distributed to balance demands among machines. High demand data base/application program combinations can be moved to separate HP3000's. Those remaining lower usage combinations can be allocated to other systems. It may occasionally be necessary, then, for an application to reference a remote data base. RDBA can do this without any concern during application design as to whether data bases will be local or remote.

So the beauty of HP's approach to distributing data bases is its independence from both programs and machines. A data base administrator maintains access files which identify by name the location of the data base. To access any data base, be it local or a directly connected remote one, users only need to know the name of the data base—not the location. RDBA, not the user or program, keeps track of where data bases reside. In the case of accessing multiple data bases at one remote location, the user simply specifies each data base as a separate statement.

Cut communication costs

Data communication costs are still rising. However, a data compression technique used when information is sent between remote HP3000 data bases can significantly reduce data transmission time and produce substantial line cost savings. The amount of data compression depends entirely upon data file content. Typically, normal source code files can be reduced as much as 40%; although those containing many blanks could be compressed as much as 80%.

Remote data base access is free to those IMAGE/3000 customers with distributed systems.

Indicate F, G on the reply card if you wish further information on RDBA, IMAGE/3000, or HP's distributed systems network.

An innovative extension to IMAGE, HP3000's data base management system, RDBA adds a new dimension to the concept of distributed processing. With RDBA, programs on one HP3000 get information from a remote HP3000 IMAGE data base just as if it were a local one.

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Packet Service to Connect Italian Users With U.S.

CUPERTINO, Calif. — Tymnet, Inc. has announced what is reportedly the first connection of a packet network between Italy and the U.S. The new service, to be called Direct Access to Remote Data Bases Overseas (Dardo), will link the facilities of Italcable, which is Italy's international record carrier (IRC), and the Italian Postal and Telephone Administration with the Tymnet network in the U.S.

Italcable has purchased from Tymnet a network node (Tymsat) to provide terminal access for this service. The Tymsat has been installed in Rome for several months, awaiting approval of the service by the Italian Postal Administration.

Italcable's Tymsat equipment allows up to 64 simultaneous terminal users to access U.S. computers, with local call access in Rome and Milan. Virtually all types of terminals operating between 10- and 120 char./sec can be accommodated. Initially, Italcable has restricted access to 10- and 30 char./sec, according to Tymnet.

The Italcable service connects to Tymnet via transatlantic circuits operated by the major IRCs. Tymnet, Inc. has operating agreements with ITT Worldcom, RCA Global Communications, Inc., TRT Transmission and Western Union International, Inc.

Rates for the Dardo service are expected to be about $20/hour plus 50 cents per 1,000 characters transmitted, a Tymnet source estimated. The Dardo tariff is being filed by Italcable with the Italian Postal Administration, and final rates may vary.

Using an interim rate schedule, about 10 customers in Italy are currently accessing U.S. data bases connected to the Tymnet public network.

Tymnet equipment is installed for international access in London, Paris, Berne, Brussels, Amsterdam, Vienna and Frankfurt. Access to the Telenet packet network is also provided through the Tymnet Tymsat equipment at these locations.

Tymnet, Inc. is at 20665 Valley Green Drive, Cupertino, Calif. 95014.

Course to Teach Basic Concepts

SANTA CLARA, Calif. — A course on basic data communications concepts for users of IBM 370 and compatible systems is being offered by Memorex Corp.

The course will benefit systems analysts, programmers and other personnel with responsibility for planning, installing and maintaining data communication systems. Course objectives include identifying the functional elements of a data communications system and cost and efficiency trade-offs and understanding the functions of front-end processing and test equipment, Memorex said.

The course is available in a one- or three-day format. The one-day session is for DP managers and programmers needing a basic understanding of data communications concepts and terms.

The three-day course reportedly includes everything discussed in the one-day program, with the second and third day focusing on practical topics of use to systems designers, programmers and operations personnel. Exercises in network cost analysis and performance, EIA interface operation, coding schemes, line protocols and transmission modes are also included.

The course will be taught by Memorex personnel in major cities. Sixteen classes are scheduled for the second half of 1978. Base price for the three-day class is $420, and the one-day seminar is $245. Details are available from the Memorex Customer Education Department, 1125 Memorex Drive, MS 0064, Santa Clara, Calif. 95052.

Direct-Connet Modems Replace Bell 103/113

SUNNYVALE, Calif. — A series of direct-connect, 300 bit/sec full-duplex, stand-alone replacements for Bell 103/113 modems, is now available from Racal-Vadic.

Specifically designed for remote terminal users, the VA355 switched network modems have been registered for direct connect under Federal Communications Commission Rules, Part 68, eliminating the need for the rental of Data Access Arrangements (DAA) from the telephone company. a leased-line version is also available for use in point-to-point or multipoint systems.

The VA355 power supply, a major source of heat, is a compact module located at the AC plug. This outboard power supply, removed from the main chassis, is said to reduce heat within the modem itself, providing reliability, longer life, and improved performance.

Three models are available. The VA355P provides direct connect to either voice or data jack, the VA355S offers direct connect to data jack only and the VA355G was designed for two-wire leased-line operation.

VA355 prices start at $375.

Racal-Vadic is at 222 Caspian Drive, Sunnyvale, Calif. 94086.

DOING BIG THINGS WITH SMALL SYSTEMS

A Special Report on Minicomputers and Small Business Systems in the August 28th Computerworld.

As small computer systems have become less and less expensive, the question has changed from "whether to buy" to "how to apply". A furniture store in L.A. found a mini worthwhile in cutting its delinquent accounts, while a survey company in England is using a mini on board to help locate North Sea oil reserves. And as the price tag on small business systems continues to drop, their applications will increase geometrically.

In our August 28th Special Report, we'll be taking a closer look at the profits (and pitfalls) of mini-using. Featuring a series of applications and tutorial stories, this supplement will examine how others have solved their mini problems, and will include tips from vendors. It will cover topics like:

- *Use of small computers in large system hierarchies*
- *Minicomputers as software development tools*
- *How to select a printer for mini systems*
- *Future developments in disk systems design*
- *Maintenance of magnetic storage media*

If you're interested in new ways to increase efficiency and cut costs in your business operations, don't miss this *Computerworld* Special Report: And if you are a manufacturer or dealer in minicomputer equipment, your ad should be there. Closing date is August 11th. Call your *Computerworld* salesman for more information and complete assistance in ad planning. Or, to place an ad, call Terry Williams at (617) 965-5800.

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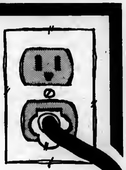

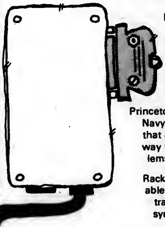

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Paradyne PIX-II Gets Support For Remote IBM 7770s

LARGO, Fla. — Paradyne Corp. has unveiled software enhancement to its PIX-II virtual data link that enables the system to support IBM 7770 audio response units in a remote mode.

Using 7770 software, the PIX-II is reportedly one of the first data communications systems to allow IBM 360/370 users to place 7770 audio response units in branch or regional locations and to allow them to communicate with a centralized host system over a telecommunications line. Previously, audio response units had to be connected directly to a CPU.

Lower Line Costs

By allowing their operation in the field, the PIX-II system is said to reduce telephone line costs. In addition, because all teleprocessing control functions are handled by the PIX-II system itself, the 7770 does not need teleprocessing software to support it, according to a spokesman.

The software can be added to PIX-II systems already installed in the field, Paradyne said.

The PIX-II virtual data link allows IBM 360/370 users to reduce communciations costs by linking multiple remote devices to a central host computer over a single communications line and to implement Synchronous Data Link Control protocol without teleprocessing software overhead on the mainframe.

PIX-II consists of a local control unit that attaches to the byte multiplexer channel of the host and remote channel units in dispersed sites which can support multiple IBM and/or Paradyne devices. Such devices could include interactive CRTs, printers, card readers and tape drives a well as the IBM 7770 or plug-compatible audio response units. All data communications functions are transparent to both the host and remote users, and remote devices function in a local mode, the firm said.

The 7770 capability is available for $39/mo on a three-year lease or costs $1,755 to purchase from Paradyne Corp., 8550 Ulmerton Road, Largo, Fla. 33541.

Basic CRT Offers Choice Of Screen Format, Size

LOS ANGELES — A low-cost CRT terminal with either 64-by-16 or 32-by-16 character screen formats has been added by Informer, Inc.

The D-311 CRT is available with either a 6 or 9 in. screen and is basically the standard Informer terminal without factory-set options, the firm said, adding that customers may select keyboard style, transmission rates and type of cursor.

The D-311 features an optional upper case only keyboard, 15 selectable transmission rates, switch-selectable full- or half-duplex operation and automatic scrolling.

It also offers blinking display fields in two intensities, selective erasure, an RS-232C interface, an underscore cursor with grid positioning, odd parity and automatic line feed.

The D-311 CRT terminal costs $850 from Informer, Inc. at 8332 Osage Ave., Los Angeles, Calif. 90045.

Datamedia Adds Buffered CRT To Elite Family

PENNSAUKEN, N.J. — A buffered APL/Ascii CRT terminal with transaction processing capabilities has joined the Datamedia Corp. Elite 3000 family of CRTs.

The microprocessor-based Elite 3045A is said to offer protected formats, video enhancements and APL overstrike/Ascii underscore. The terminal also features character-interactive, line-or page-mode communications and asynchronous or optional isochronous communications interfaces, a Datamedia source added.

Cursor Addressability

The 3045A provides cursor addressability and remote position sensing, 10 user function keys and compatibility with RS-232C and 20 Ma current loop interfaces and with Bell 103 and 202 modems.

No memory address space is required to support the screen enhancements, and a detached keyboard offers selectable transmission rates.

The Elite 3045A costs $1,995 in single quantities or $1,520 in quantities of 100, the firm said from 7300 N. Crescent Blvd., Pennsauken, N.J. 08110.

Diablo 2300 Given Remote Print Ability

HAYWARD, Calif. — A current-loop interface that makes the Diablo Systems, Inc. 2300 matrix printer suitable for remote printing has been introduced by the firm.

The Model 304036-01 interface consists of a single field-installable printed circuit card that replaces either the standard parallel or RS-232C serial interfaces the 2300 currently carries, a Diablo source said.

The interface employs a four-wire, full-duplex connector for compatibility with high-speed teleprinting networks, the source noted, adding this also serves teleprinter applications requiring two-way, send-receive data communciations.

Use of current loop interfaces, which require fewer wires and simpler connectors than either serial or parallel interfaces, can offer a significant cost savings in many types of matrix printing applications, according to a Diablo spokesman.

The Model 304036-01 costs $105, the firm said from 24500 Industrial Blvd., Hayward, Calif. 94545.

Vendor's System Proves Its Purpose

By Howard A. Karten
CW Staff

SAN ANTONIO, Texas — A recent flood in one of Datapoint Corp.'s executive buildings here knocked out one of the processors in the company's Attached Resource Computer (ARC) system, but the distributed system continued to work without the damaged component.

The flood, caused by an overflowing toilet on the top floor of the building, shorted out a Datapoint 6600 system used as a file processor. However, the ARC system — composed of 54 Datapoint computers used as applications processors and nine as file processors — kept operating without the damaged processor.

"Although we didn't plan on this flood, it certainly was a graphic demonstration of how a functionally dispersed system operates and can continue to operate in the face of even the most adverse conditions," Vic Poor, senior vice-president of research and development, said. "One of the essential features of the system that we have emphasized is its relative invulnerability to system stoppage."

Three Buildings Linked

The ARC system, which Datapoint has sold to several commercial customers, has been in use at the vendor's site since December. It connects the marketing, R&D and software support departments — located in three separate buildings — via coaxial cables and Resource Interface Modules (RIM) that allow the applications processors and file processors making up the system to participate in a unified — but distributed — system.

These three departments use the system for a variety of functions, including market research and program development. In addition, the system forms the primary computing facility for the vendor's program development effort.

The file processor and its accompanying disk drive were shorted out and almost totally disabled by the flood of water and debris that rained on them. The drive and the processor will require complete refurbishing before they can be restored to service, company officials said.

While damage was estimated at $66,000, dismay at this figure was tempered by the knowledge that the unplanned event — and the response of the ARC system — would serve as a testimonial to the system's abilities, the officials said.

"It would be an understatement to say the ARC system is a vital ingredient in our daily program development and DP operations," Poor stated. "The system is used by a large number of people who log on and off at all hours of the day and night, depending on their work schedule.

"Although this file processor was subjected to catastrophic conditions, the rest of the system performed perfectly well. Users who were not accessing that particular disk within the system never realized the system was experiencing physical difficulties.

"In fact, many of these same ARC users

(Continued on Page 58)

From Culler-Harrison

System Gives Pipeline Processing

GOLETA, Calif. — Culler-Harrison, Inc. (CHI) has designed a microprogrammable system emphasizing parallelism and pipeline processing for users needing massive mathematical calculations or the processing of large volumes of data.

Potential uses for the system include signal and speech data processing, speech recognition and large three-dimensional magnetohydrodynamics (MHD) problems, the vendor suggested.

The system consists of four fast disks and six independent microprocessors — a macro processor, an array processor, and four independent microprocessors, for I/O. The array processor, designated the AP-120B, performs high-speed floating-point arithmetic operations; it has already been widely used in geophysical and medical research, according to the company.

The macro processor, the MP-32C, serves as the array processor's host computer and is used for control, I/O, bookkeeping calculations and integer arithmetic operations. It supports an interactive mathematical system, a text editor, file facilities and appropriate assemblers and linkers, a spokesman noted.

CHI's MP-32A System

The four I/O processors are fixed program microprocessors with direct memory access (DMA) to the main memories of both the array and macro processors. The primary function of the I/O processors is to provide high-level control over access to the fast disk drives, CHI said.

The highly parallel structure of the system allows each of the six processors to operate independently under the control of the macro processor, the spokesman explained. Each processor is scheduled to perform a specific task. On completion of the task, it interrupts the host; if its next task has been scheduled, it begins that task immediately without having to wait for service from the host.

This enables the system to handle extremely large-scale computing problems, the

(Continued on Page 56)

IBM 3031 ‘Outstanding So Far’

By Howard A. Karten
CW Staff

DENVER — Diners Club, Inc. was "pretty much at the breaking point" with its Honeywell Information Systems, Inc. H-4200 when it began considering replacement alternatives for the second-generation equipment. Now that it has installed an IBM 3031, "our overall impression of the system so far is that it's outstanding," according to Bill Freda.

Freda, an assistant vice-president with the company, said the move to new equipment was part of its long-range growth plan. Diners Club is looking for a resultant increase in cardholders and member establishments.

To replace its aging HIS system, the company brought in an IBM 3031 with 3M bytes of storage, IBM 3330 and 3350 disk drives, Model 3420 6,250 bit/in. tape drives and a network of Model 3277 CRTs. The mainframe is operating under the MVS operating system, using two 3705 teleprocessing controllers and an audio response unit manufactured by Wavetek Data Communications, Inc.

Diners Club began studying alternatives for replacing the HIS equipment more than a year ago by looking at the HIS Series 60 equipment and the IBM 370/158. "We didn't want to get involved in a wholesale vendor evaluation," Freda recalled, "so we looked at the Honeywell system as a courtesy and at the IBM equipment. Five other managers and I spent a year studying the capabilities of both systems, including inter-

(Continued on Page 58)

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Pioneer Starts Multiple-Output Power Family

SANTA MONICA, Calif. — Pioneer Magnetics, Inc. has introduced the first half of a two-member family of high-power, multiple-output power supplies it designed for a variety of computer and electronic control applications.

The PM2803 provides regulated output at power levels up to 1,150 watts, using input voltage ranging from 184 to 250 Vac, a spokesman said. It is capable of operation at 140 Vac for several minutes, if necessary, he added, noting the unit can hold output voltage for a minimum of 30 msec in the event of a power drop.

Three output channels are available that provide maximum power ratings of 650, 500 and 300 watts respectively, with standard output voltage channels available from 2V to 48V.

Additional, standard features on the device include overload, short circuit and reverse voltage protection on each output, automatic overtemperature shutdown and overvoltage protection on the main channel.

Remote sensing to compensate for voltage drops in the output lines is also standard on all channels, the spokesman said.

Options available with the unit include logic inhibit, input power fail signal, output power good signal, remote margin check or programming and sequencing.

The PM2803 is capable of operation at temperatures ranging from 0° to 50° C at full load, with a derating to 80% at 70°C, and has self-contained cooling. A "total error band" concept is said to ensure that output variations will not exceed a ±2% deviation from a set value because of line changes, static and dynamic load changes, ripple and noise spikes and temperature variations and drifts.

The PM2803 sells for $950 from Pioneer Magnetics at 1745 Berkeley St., Santa Monica, Calif. 90404.

System Backs Pipeline Processing

(Continued from Page 53)

spokesman pointed out.

Software support for the system includes Fortran, Basic, a special Math System Language and a macro language. In addition, there is a micro language for the array and macro processors.

Special software packages are available that include fast Fourier transforms and plasma particle push codes, CHI said.

The Math System Language was developed over several years in conjunction with physicists and applied mathematicians working on complex scientific problems, the firm said, adding that programming in this language is less error-prone than standard Fortran.

The operating system for the computer supports both batch and on-line work, the firm said, and a standard configuration supports six Tektronix, Inc. consoles, although that number can be expanded.

Memory access conflicts are eliminated by having programs, constants and data reside in separate, independent memories. Independent, pipelined floating-point multiplier and add units allow both a multiple and an add operation to be initiated every 167 nsec, CHI said.

Up to 4 million floating-point operation/sec have been performed in fluid code problems, and up to 6 million floating-point operation/sec have been executed in problems involving particle codes, the spokesman said.

To achieve these speeds, the macro processor on the system has a 167 nsec instruction time and can execute up to 4 operation/instruction. Memory for the macro processor consists of 65K words with a 333 nsec cycle time and three additional fast access memories: a read-only instruction memory of 512 words, a 64-word random-access instruction memory and a 64-word scratch pad data memory.

Integer multiplication of two 16-bit words occurs in 333 nsec, the firm said.

The array processor on the unit is a 38-bit floating-point arithmetic unit with a maximum speed of 12 million floating point operation/sec. It consists of 65K words, also with a 333 nsec cycle time, expandable to 1M word, the spokesman said.

Other components of the array processor include a random-access instruction memory of 512 words (expandable to 4,096), a 333 nanosec fixed table memory of 2,560 words and two 32-word data pad memories.

In addition, two blocks of fast access floating-point accumulators, with 32 locations each, are available for temporary storage of intermediate results from the multiplier, adder or memory. An independent integer arithmetic unit performs indexing and counting functions while floating-point data, using 38-bit words, provides a precision said to exceed eight decimal places.

Each instruction word in the system has 64 bits, grouped into five general areas: program control, address control, arithmetic, memory and I/O.

Prices for the system begin at $325,000. CHI is at 150A Aero Camino, Goleta, Calif. 93107.

Disk Pack Trends — Part 1

Technology Dictating Return to Fixed Disks

By Phillip R. Ricketts
Special to CW

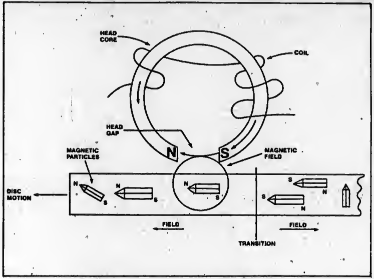

Figure 1: Major Head and Disk Elements

Although disk pack technology has steadily advanced over the past 15 years, the most dramatic changes have taken place only recently. The fixed disks of the early generation disk drives gave way to removable packs on later equipment, but technological considerations are dictating a return to the earlier fixed media drives.

In little more than a decade, disk storage capacities have increased from less than 10M bytes to more than 300M bytes per pack, even while the cost per bit has been dropping. Special disk-coating techniques and chemical formulations have increased data integrity and substantially extended the life of the average disk pack.

However, the price/performance ratio and quality characteristics will have to be further improved as more computer users turn toward on-line, communications-oriented applications.

Three Categories

Rigid disk media for medium- to high-capacity applications consists of three basic types of devices: disk packs, data modules and head-disk assemblies (HDA). The most common of these, disk packs, offer storage capacities ranging up to 300M bytes and may be freely interchanged between compatible drives.

Perhaps the most significant change to occur in disk pack technology in recent years has been the integration of read/write heads, disks and associated electronics into sealed cartridges. Both data modules and HDAs utilize this integrated technology.

Data modules differ from HDAs principally in the fact that they are removable, while HDAs are installed by the drive manufacturer and are not generally removable by the user. Data modules are available in capacities ranging from 35M to 70M bytes, while HDAs vary from less than 25M to 317.5M bytes, depending on the particular type of drive unit and application.

Before considering the reasons why sealed packs with integrated heads are being used to increase storage capacity and enhance reliability, a review of disk recording and the various techniques used for increasing capacity may be appropriate.

Information is recorded onto and read from the media by moving a disk past a read/write head. The disk is made of aluminum coated with tiny, needle-shaped iron oxide particles dispersed in a binder material. The major elements of a read/write head and disk consist of a core, a wire wrapped around the core, a gap at the bottom of the core and iron oxide particles in the disk coating (Figure 1).

The disk spins past the head, creating an air cushion on which the head rides. The altitude of the head over the disk surface can be varied by changing the load applied to the head or the aerodynamics of the head (the principle used is fundamentally the same one used in aircraft wings).

To create an information bit, the core is magnetized by passing a current in one direction through the wire surrounding it. The magnetic field passing through the core tries to jump the gap in the core; this magnetizes the iron particles in the disk coating in the same direction as the magnetic field.

A bit is created by instantaneously reversing the current through the wire, thereby establishing a magnetic field (magnetic domain) in the opposite direction. Whether there is a 0 or a 1 on the disk depends on how far apart the

(Continued on Page 59)

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The system is the solution.

Bell System

Serial Belt Printer Works With Datapoint 1500

SAN ANTONIO, Texas — Datapoint Corp. has unveiled a serial belt printer capable of printing up to 240 line/min for use with the Datapoint 1500 dispersed processor.

The 96-character print belt includes upper and lower case alphanumerics, punctuation marks and special characters, according to the company. The maximum line width is 132 characters, printed at 10 char./in.; spacing is 6 line/in.

Varying Widths

Forms for the printer can vary from 1.75- to 15 in. in width; vertical forms control is accomplished through software. A maximum of one original and five copies can be printed at one time, according to a spokesman.

A forms tractor feeds standard, edge-punched forms to the printer, which attaches to the RS-232 port of the Datapoint 1500. The printer also includes indicator lamps to inform the operator of fault conditions, such as end-of-forms and off-line status.

The printer sells for $9,200. Discounts are available for quantity purchases. Maintenance support is $88/mo, the company said from 9725 Datapoint Drive, San Antonio, Texas 98284.

System Proves Its Purpose

(Continued from Page 53)

still haven't heard and do not realize that part of the system was affected," he remarked.

Because of the company's standard procedures, no data was lost as a result of the incident. Disk files are backed up at the end of every working day; in addition, the disk packs themselves were cleaned and dried, and the data on them was recovered.

The ARC system was designed to distribute processing capabilities and files among differing locations in such a manner as to be transparent to its users [CW, Dec. 5]. Components of the system — which has an aggregate memory size of 6.5M bytes and total on-line disk storage of 800M bytes — are routinely powered down for maintenance and other reasons without requiring the entire system to halt its processing.

Therefore, although the file processor involved was powered down unexpectedly — and in a manner not exactly prescribed in the documentation — users of the system were unaware of the incident since none were using data on the affected disk at the time.

Pleased With Demo

Company officials said they were pleased with the demonstration of the system's relative invulnerability to loss of productivity. "Although we didn't plan on this flood, it certainly is a graphic demonstration of how a functionally dispersed system operates and continues to operate in the face of even the most adverse conditions," Poor said.

IBM Mainframe 'Outstanding'

(Continued from Page 53)

viewing users of both systems."

Part of this analysis was a benchmark on the IBM 370/158, prior to IBM's 3031 announcement. When the prices and performance of the 3031 were announced, the benefits of that system compared with the 370/158 were immediately apparent, and the user concluded the IBM system was more cost-effective, Freda said.

"Over a seven-year period, we anticipate a savings in the hundreds of thousands of dollars in maintenance costs alone," he added.

He noted, however, that both systems have the technical abilities to service the company's future systems plans.

Since Diners Club was "in a maintenance environment" at the time and not installing any new systems, "the 1960-vintage 4200 system was performing acceptably," Freda said. In looking to the future, however, the company knew its capacity would have to be expanded since "there's simply no comparison between the older equipment and either the Series 60 or the IBM system."

Conversion Aid

Most of Diners Club's programs are written in Cobol, so it knew there would be some problems in changing vendors. However, the use of IBM's Structured Programming Facility (SPF) under the MVS Time Sharing Option (TSO) has been "instrumental" in helping with the conversion, the manager explained.

"Our programmers love TSO; they love SPF even more. SPF is what really makes the system," he commented.

Some minor problems were encountered in installing the hardware and generating the software for the 3031, Freda said, but nothing out of the ordinary, given the nature and scope of the conversion.

"We had the typical startup and learning curve problems, and we've had quite a training program to go through because of the new tools we have," he remarked, but added that appears to be all behind him now.

At present, Diners Club is running parallel tests on the systems. Although none of its on-line systems have yet been moved to the 3031, it expects to be finished with the conversion by next April.

Cramer announces the first
of Lear Siegler display term

You could call our new Lear Siegler terminal franchise dumb or smart, and be right on both counts.
That's because Lear Siegler is the recognized leader in "dumb" and "smart" display terminal technology. With advanced terminals featuring field-proven quality and reliability. Lear Siegler's recent appointment of Cramer as the first nationwide stocking representative for the full line of Lear Siegler interactive display terminals means that Cramer now offers you the widest choice of terminal types to meet your price/performance and application requirements.

The ADM3A *"Dumb™" Terminal* is a teletype CRT replacement featuring a 1920 character screen and direct cursor addressing, with extreme flexibility provided by 33 switches that permit variable word structure, baud rates of 75 to 19,200, and RS232 or 20mA current loop interface.

The ADM1A *"smart"* terminal offers a 1920 character screen with 64 ASCII set, block transmission mode with editing, forms fill-out, and cursor addressing and read. Plus switch-selectable variable word structure, baud rates, and RS232 or 20mA interfaces.

The ADM2 terminal offers the additional features of a detachable keyboard with numeric keypad, uppercase/lower-

Get it fast through your local Cramer connection

Technology Dictating Return to Fixed Disks

(Continued from Page 57)

oppositely magnetized domains are in time.

What we have then are continuous — although separate — magnetic domains around a track. Whether a 0 or a 1 is present depends on when the direction of the current — and resulting direction of the magnetic field or domain — was reversed.

Reading information back from the disk is accomplished by moving the read/write head through the magnetic field which protrudes slightly above the disk surface. The head senses both the direction of the field and the time elapsed between reading oppositely magnetized domains; these pieces of information are combined in determining whether a 0 or a 1 has been read.

The key factor in increasing the capacity per disk is the size of the magnetic domains on the disk. To do this, the area of the magnetic domain must be still further reduced — no easy task.

Data density on a recording surface (bit/in. multiplied by track/in.) is mainly a function of four elements: head gap size, disk coating thickness, altitude of the head above the disk surface and head positioning.

As illustrated in Figure 2, the first three parameters have been steadily decreasing, and the interval between the introduction of the Memorex Corp. Mark I and the 3650 is only 10 years. The Mark X represents the midpoint in this interval, 1972, while the 3650 was introduced just last year.

Ricketts is with Memorex Corp. Part II will discuss the design and manufacture of HDAs and data modules.

MEMOREX MODEL	CAPACITY (Megabytes)	AREAL DENSITY	HEAD GAP (MicroInches)	FLYING HEIGHT (MicroInches)	MEDIA THICKNESS (Microinches)
Mark I	7	1.1×10^6	200	125	200
Mark VI	30	2.2×10^6	105	80	110
Mark X	100	7.7×10^6	105	50	50
Mark XI	200	1.5×10^6	105	45	35
Data Mark	70	1.7×10^6	55	19	35
3650 HDA	317.5	3.0×10^6	55	21	35

Figure 2: Areal Density Parameters

IBM Users Get Zapper to Test Noise Problems

IRVINE, Calif. — An electromagnetic compatibility simulator that reportedly allows IBM users to evaluate the electrical noise susceptibility of mainframes and add-on equipment has been introduced by Data Systems Marketing (DSM).

The Zapper replaces a similar test instrument, not readily available from IBM, DSM said. It was designed to apply high voltage noise pulses directly to the cabinet of a CPU or peripheral to see if it will withstand the interference.

Computer systems have always been subject to potential malfunctions from unwanted electrical signals generated by sources such as radio transmitters, welders, radio frequency induction heaters, intermittent grounds or radar or locally generated electrostatic discharges, a DSM spokesman explained. The Zapper provides users with a device that can simulate a typical, but controllable electrical noise disturbance so a system's interference rejection capacity can be measured, he added.

The Zapper contains five components: a power module, a capacitor vane assembly, a probe assembly, a probe converter and a single discharge control unit. To use the instrument, the vane assembly is positioned to make electrical contact with the metal cover or frame of the unit under test. An electrical charge, variable from zero to 2,500 volts, is then discharged onto the equipment.

At the same time, the CPU runs specific diagnostic progams to determine the highest voltage level at which the system will operate error-free for a minimum of three minutes.

Since each installation has its own electrical noise environment, the testing will not guarantee a system will be totally unaffected by electrical noise after installation, the firm noted.

The instrument can also be used to check out printed circuit boards and other computer components and to solve loose trilead problems, detecting sensitive PC cards, open-land patterns or missing terminators, the firm added.

The Zapper costs $5,995 from DSM at 17941 Sky Park Circle, Irvine, Calif. 92714.

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case and 16 function keys as well as blinking fields, security fields and status lights on screen.

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Mini Bits

Short Course For Users Will Cover Advanced DP

MILWAUKEE — Programmers, applications specialists and other users who want to increase their knowledge of hardware and software will reportedly have the chance to do so at a short course slated for Sept. 25-29 at the local branch of the University of Wisconsin.

Sponsored by the university's Department of Engineering & Applied Science, the "Mini/Microcomputer Systems" program will begin with an overview of computer and programming basics and then proceed systematically to more advanced material.

The course costs $395 and will take place at the university's civic center campus.

For more information, contact program director John T. Snedeker, University of Wisconsin-Extension, Department of Engineering & Applied Science, 929 N. Sixth St., Milwaukee, Wis. 53203.

Printer Controller Fits PDP-8s

HOUSTON — A line printer controller from Computer Extension Systems, Inc. (CES) is said to provide hardware and software compatibility with the Digital Equipment Corp. PDP-8A, -E, -F and -M.

Packaged on one board that fits in a PDP-8 Omnibus slot, the LPC8 comes with an onboard jumper than ensures software compatibility with the LE8 and LA8 line printers, according to CES officials.

A four-position DIP switch permits users to invert printer control functions, while a six-position DP switch permits device code selection.

An LPC8 with a 10-foot ribbon cable costs $475 with OEM discounts available from CES at 17511 El Camino Real, Houston, Texas 77058.

Tab Adds Forms Burster

PALO ALTO, Calif. — Intended primarily for small- and medium-scale business systems, a forms burster from Tab Products Co. reportedly operates at up to 200 ft/min and accepts forms 2-3/8- to 16 in. wide and 2-3/4- to 12 in. long.

The Model 2444 also provides an adjustable bursting bar for forms of any width.

A companion product, the Model 2422 decollator, can accommodate printouts up to 8 in. thick and remove a carbon and copy at 450 ft/min.

The forms burster and decollator cost $995 and $460, respectively, from Tab at 2690 Hanover St., Palo Alto, Calif. 94304.

HP Extends Main Memory, I/O Capability of 9815

By Jeffry Beeler
CW Staff

PALO ALTO, Calif. — Two times more main memory plus standard interfacing capabilities have reportedly been added to the Hewlett-Packard Co. 9815 desktop calculator to produce a systems version of that product.

By using 16K-bit random-access memories, a standard 9815S holds 4K bytes on one memory board, according to HP officials. Because the board occupies all the CPU's memory space, users cannot expand the main storage capacity of the 9815S.

By contrast, the other 9815 version — the 9815A — stores a minimum of 512 bytes, but that basic system provides enough spare CPU chassis space to expand as much as 2K bytes, according to an HP spokesman.

The 9815S also provides 3,800 program steps, compared with 472 for the A version. Because of the additional program steps, the S version can perform computations and data acquisition tasks that formerly could have been done only by minis or more expensive desktop computers, the spokesman claimed.

Among its other enhancements, the 9815S offers as standard equipment a built-in backplane with two I/O channels. A standard model A configuration, by contrast, lacks a built-in I/O backplane, although users can order the feature as an option for $200.

A typical 9815S configuration incorporates an eight-bit CPU, integral 16-character printer, one 225K-byte cartridge system,

(Continued on Page 62)

Service Firm's Small Systems Speed Inventory Accounting

KING OF PRUSSIA, Pa. — Inventory taking has improved in efficiency by up to 30% at Sorbus, Inc. since the third-party computer service firm bolstered its stock control operations with seven almost identical small business systems.

Described as one of the nation's largest collections of DP hardware dedicated to one application, the systems help Sorbus locate parts among the more than 78,000 inventory items at the company's central stock depot here and at its more than 2,000 remote storage sites across the U.S.

The systems, which perform an average of 110,000 inventory transactions each month, also control ordering from Sorbus' nearly 100 parts suppliers, according to Ray Castelhano, the service firm's director of field systems and administatrion.

Castelhano credits the systems, which together form Sorbus' Field Inventory System (FIS), with eliminating unnecessary parts purchases. He also credits the FIS with giv-

(Continued on Page 64)

Sorbus DP center houses seven Basic/Four System 700s.

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HIS Level 6 Users Gain Mass Storage Capability

IRVINE, Calif. — Users of the Honeywell Information Systems, Inc. Series 60 Level 6 minis can reportedly add up to 1.2G bytes of mass storage with a disk system from Telefile Computer Products, Inc.

The system, which acommodates memory expansions for less than $62 per megabyte allows users to convert to 3330 or other drive types merely by replacing the units' plug-in interface, according to Telefile spokesmen.

The system's controller and device-handling software ensure the replacement drive will be transparent to both a user's application program and operating system, they added.

Ranging in capacity from 25M to 300M byte/spindle, the system consists of disk drives, a rack-mounted Matchmaker controller and the interface, which connects to the HIS CPU or expansion chassis megabus.

Each controller can accept one to four spindles, and users who require more than four spindles can attach additional controllers.

The disk system transfers 1,290K byte/sec and rotates at 3,600 rpm with an 8.3 msec average latency, Telefile officials said.

It also seeks in an average of 35 msec with 10 msec track-to-track access.

Other features reportedly available with the unit include multisector operations across head and cylinder boundaries, variable search and read functions and write protection to the sector level plus single-sector or full-track formatting.

Users add the device-handling software to their Gcos operating systems when they implement their configurations.

A 300M-byte drive and controller costs $27,000, compared with $16,000 for each additional 300M-byte increment.

A stand-alone diagnostics software package is also available free from Telefile at 17131 Daimler St., Irvine, Calif. 92714.

Memory, I/O Added for 9815

(Continued from Page 61)

CRT and keyboard. To this system, users can also add a second 225K-byte cartridge for a total mass storage capacity of 450K bytes, an HP official said.

With the built-in cartridge system, users can record additional programs or operate HP's library of prerecorded programs such as those for surveyors, clinical lab technicians, structural engineers and statisticians.

The 9815S also comes with a choice of seven interface cards that support plotters and additional printers through the system's two I/O ports. Some of these interfaces include RS-232, eight-bit parallel and nine-digit binary coded decimal cards.

Accommodates 14 Peripherals

The Model S accommodates up to 14 peripherals or data acquisition instruments through its IB/IEEE-488 interface bus card, HP officials said. Some of the nearly 60 types of measuring instruments supported by the system include digital voltmeters, spectrum analyzers and counters.

Like its Model A counterpart, the 9815S provides 28 built-in scientific functions that are said to allow users to calculate square roots and to perform trigonometric, logarithmic and exponential operations.

With this programming logic, users can take advantage of features like automatic address updating during editing and descriptive error messages.

A typical 9815S configuration sells for $3,950, with interface cards costing an additional $400 each. Deliveries of the system will begin in mid-August from HP at 1501 Page Mill Road, Palo Alto, Calif. 94304.

Desktop System Offers Basic, Fortran Packages

BEDFORD, Mass. — Users of a desktop computer from Imex Computers, Inc. can choose between a Basic software package for commercial applications and an optional Fortran IV package for scientific and engineering jobs.

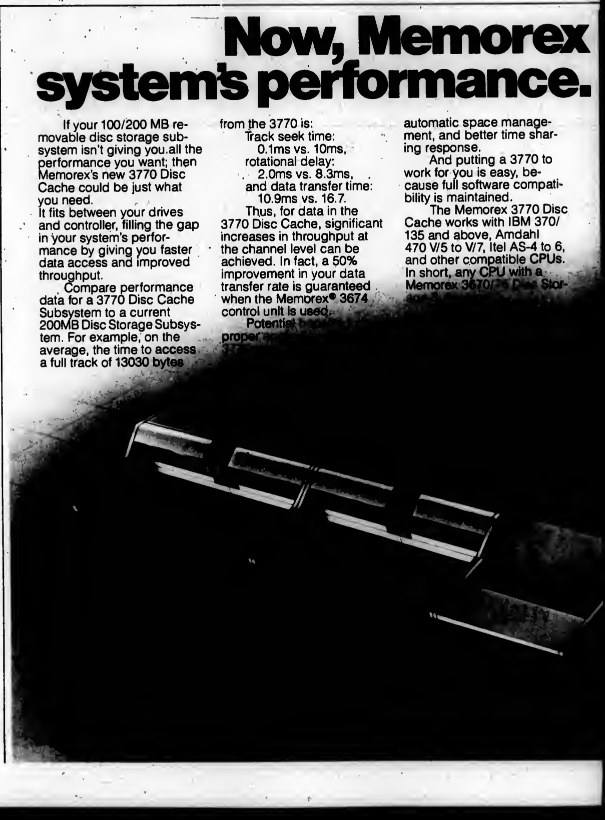
Built around a 3 MHz Intel Corp. 8085 microprocessor, the Impak M-1 supports two 512K-byte floppy disk systems in a standard configuration and accommodates up to three additional dual-disk systems for a total storage capacity of 4M bytes, according to a spokesman for Imex, a division of Boston-based International Materials Corp.

The system also includes a 1,920-character CRT terminal.

Support software available with the computer includes utilities; a disk operating system with text editor and job management capabilities plus file and storage management facilities; and debug and diagnostics capabilities.

The system's Fortran IV Level 2 Ansi compiler, meanwhile, provides three-dimensional displays, mixed-mode arithmetic and an assembler that generates relocatable code compatible with Fortran IV object code.

A 1M-byte Impak M-1 with Basic software costs $7,300 from the company at 54 Middlesex Tnpk., Bedford, Mass. 01730.



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If your 100/200 MB removable disc storage subsystem isn't giving you all the performance you want; then Memorex's new 3770 Disc Cache could be just what you need.

It fits between your drives and controller, filling the gap in your system's performance by giving you faster data access and improved throughput.

Compare performance data for a 3770 Disc Cache Subsystem to a current 200MB Disc Storage Subsystem. For example, on the average, the time to access a full track of 13030 bytes from the 3770 is:

Track seek time:
0.1ms vs. 10ms,
rotational delay:
2.0ms vs. 8.3ms,
and data transfer time:
10.9ms vs. 16.7.

Thus, for data in the 3770 Disc Cache, significant increases in throughput at the channel level can be achieved. In fact, a 50% improvement in your data transfer rate is guaranteed when the Memorex® 3674 control unit is used.

Potential [illegible] proper [illegible]

automatic space management, and better time sharing response.

And putting a 3770 to work for you is easy, because full software compatibility is maintained.

The Memorex 3770 Disc Cache works with IBM 370/135 and above, Amdahl 470 V/5 to V/7, Itel AS-4 to 6, and other compatible CPUs. In short, any CPU with a Memorex 3670/ [illegible] Disc Stor-

In Auto Club's MIS Department

Graphics System Drives Down Reporting Time

By Marguerite Zientara
CW Staff

MARYLAND HEIGHTS, Mo. — Graph and chart production times have dropped from four months to four minutes at the Auto Club of Missouri since the club equipped its management information systems (MIS) department with a minicomputer-based interactive graphics system.

The club has long used charts, graphs and tables to record changes, trends and relationships in its report data, and unitl 1976 the charting was done manually outside the company. Since the data is seasonal, however, it was often old and therefore irrelevant by the time the charts returned to the shop.

In addition, producing graphs externally cost the company $3,000 to $4,000 per month. The current system, however, "has paid for itself," according to Francesca Alfino, MIS manager.

In shopping for a system, the club consulted two Washington University professors who ran benchmarks and eventually eliminated Hewlett-Packard Co. and Texas Instruments, Inc. equipment from consideration. In the end, they chose a system built around the Tektronix, Inc. Model 4051 graphics system and a Tektronix Model 4662 interactive digital plotter.

"We wanted something that could easily convey ideas visually," Alfino said. "Tektronix had the most advanced graphics equipment two years ago, and it still does,"

"With graphs," Alfino siad, "you can explain something to a nontechnical person very easily because he can see it right in front of him. Everyone from salesmen to top-level managers uses them here. Especially in board of directors' meetings, when time is short, graphs simplify the presentation of information."

Duplicate System Added

The system originally had only one 32K-byte 4051, but after six months the club added a duplicate 4051. The system also includes a Tektronix 4924 tape drive, a Tektronix 4631 hard-copy unit and a Digital Equipment Corp LA 180 line printer. An Okidata Corp. Model 8034 card reader is being used only temporarily.

The 4051 connects through an RS-232 interface with the 4641 character printer. The system also uses an integral general-purpose bus to transfer 300 bit/sec between the plotter and the tape unit, which is used for additional storage.

Data for the Emergency Road Service Information program resides on a disk unit with the club's Honeywell Information Systems, Inc. 6050, which handles batch processing of payroll data, sales receipts and revenue statements. The club is transferring information between the Tektronix and HIS systems on a trial basis "to see if the two machines are compatible," according to a spokeswoman who said the club eventually plans to use the 6050 for storing other types of information and facilitating report generation.

"We won't have to manually input as much data," Alfino said. "Most of it will come from the main computer."

Originally formed to conduct special projects, the MIS department now performs additional tasks such as generating management reports, budgeting reports, emergency road service histograms and studies of road call service times. It also studies net revenues, salesmen's incomes and bodily injury claims and payments, all with totals at every level of the organization, Alfino said.

Report Production

The MIS department generates 200 reports per month, and at quarterly peaks the total reaches 600.

Data comes from such sources as club membership sales, insurance policy sales, member participation in special tours, cost and volume of emergency road service calls and general revenues and other fiscal data. Data files are maintained and updated as new information becomes available.

The department also works under government contract on various types of analyses that previously were done manually at Washington University. These analyses include projects like the "diagnostic car clinic" that at times may result in automobile recalls, Alfino said.

Within the club, the Management Information Charting Project (MICP) accounts for the largest share of user inquiries. MICP encompasses a series of programs with approximately 1,000 interchangeable data sets, provides departmental or divisional information and enables decision makers to view the organization as a whole, Alfino said. With the service, managers can see more easily how individual decisions affect the company without having to coordinate statistics, she said.

For a while after it installed the graphics system, the club experienced frequent power drains because the MIS department plugged the equipment into a wall socket. "We had to have a special line from the circuit box installed. Tektronix figured out the problem and solved it," Alfino said.

"Our line printer has never broken down and we run these things eight hours a day," she added.

and future data base application requirements.

The Memorex 3770 Disc Cache. It can help achieve improved throughput without incurring the cost of converting to non-removable 317MB drives with the fixed head feature or to fixed head disc drives. And it gives you the potential of significantly improving your system's performance.

Your Memorex representative can give you all the information, offices in principal cities worldwide. Or contact, Disc Storage Subsystems, Mail Stop 14-49, San Tomas at Central Expressway, Santa Clara, CA (408) 987-1143.

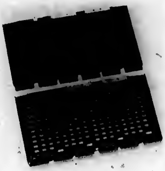
PDP-11 Add-On Offers ECC

IRVINE, Calif. — Error-correcting code (ECC) is available with an add-on memory that attaches to the Digital Equipment Corp. PDP-11 Unibus, said the product's developer, Plessey Peripheral Systems, Inc.

The PM-S11E's ECC feature combines single-bit error correction with double- and multiple-bit error detection, Plessey officials explained.

Compatible with DEC hardware and software, the semiconductor memory occupies two backplane slots and thus allows users to add options without resorting to a costly expansion chassis.

Although a standard PM-S11E stores 256K bytes, users can also specify in depopulated versions.



Plessey PM-S11E

The product costs $8,955 from 17466 Daimler Ave., Irvine, Calif. 92714.

Image Digitizer's Array Suits Most Minis, Micros

BEAVERTON, Ore. — An image digitizer from Periphicon, Inc. produces a 32 by 32 pixel (picture element) array that reportedly can be accommodated by most mini- and microcomputers.

Equipped with a general-purpose I/O port, Type 511 comes with a fl. 9, 13mm lens that focuses from .2m to infinity, according to officials with the recently formed firm. The lens connects to the unit with a 1/4-20 optical mount, while the digitizer attaches to a host computer with a TTL-level, six-contact edge card.

Type 511 also provides sensitivity equivalent to ASA 200 emulsion, the Periphicon spokesmen said. Under control of a host mini or micro, the digitizer can electronically adjust its sensitivity to allow remote control of a picture under varying ambient lighting conditions.

As a result, the unit permits repetitive scans at different exposures, which users can then combine to produce tone images, the officials explained.

Type 511 costs $200 and is available from Periphicon at Box 324, Beaverton, Ore. 97005.

Small Systems Speed Inventory

(Continued from Page 61)

ing the company's 900 national service representatives and its parts personnel in the field increased control over their inventory accounting.

Before it acquired the current hardware, Sorbus controlled its parts inventory with a batch processing system built around an IBM mainframe. Under the old system, the company's branch offices mailed their inventory documents to corporate headquarters here, where the raw data was processed, turned into finished reports and returned to its users in the field.

Unfortunately for Sorbus, production of such inventory reports often took several days. "We needed something closer to real-time processing," Castelhano recalled.

Moreover, the previous system could only track parts at the firm's permanent storage sites, not stock carried by its traveling service representatives. As a result, "a large part of our inventory was not monitored on a continuing basis; only two physical inventories were conducted each year," Castelhano added.

Time for Replacement

To overcome these problems, Sorbus officials concluded they would have to replace their existing batch processing systems with a multiterminal, interactive network that both headquarters and field personnel could understand and operate.

So in late 1976, the company transferred its inventory control system to five Model 600 small business systems from Basic/Four Corp., like Sorbus a subsidiary of Management Assistance, Inc.

After a successful trial with the 600s, Sorbus converted again to Basic/Four's larger Model 700 systems, each of which incorporates four 75M-byte disk systems and up to two 300- or 600 line/min printers.

Because of the size of the company's inventory data base and the need of all its branch offices to access that data immediately, Sorbus installed seven of the 128K-byte Model 700 CPUs. Together, these transaction processing minis support 875K bytes of semiconductor main memory, 1.05G bytes of disk storage and 76 CRT terminals.

A wide variety of Sorbus employees — secretaries, dispatchers, parts clerks, inventory specialists and supervisors — have learned to operate the systems. "We do not need specially trained DP personnel," Castelhano noted, "and many of our people can act as backup entry people."

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40 Public Utility/Communication Systems/Transportation
50 Wholesale/Retail Trade
60 Finance/Insurance/Real Estate
70 Mining/Construction/Petroleum/Refining
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80 Education/Medicine/Law
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90 Printing/Publishing/Other Communication Service
95 Other. ____________

TITLE/OCCUPATION/FUNCTION

11 President/Owner/Partner/General Manager
12 VP/Assistant VP
13 Treasurer/Controller/Finance Officer
21 Director/Manager of Operation/Planning/Administrative Service
22 Director/Manager/Supervisor DP
23 Systems Manager/Systems Analyst
31 Manager/Supervisor Programming
32 Programmer/Methods Analyst
41 Application Engineer
42 Other Engineering
51 Mfg Sales Representative
52 Other Sales/Marketing
60 Consultant
70 Lawyer/Accountant
80 Librarian/Educator/Student
90 Other. ____________

Mini Speeds Light Design Calculations Sixfold

SAN MARCOS, Texas — Calculations for lighting systems designs are completed six times faster than before at two-thirds the previous cost at Wide-Lite Corp. since the manufacturer of indoor and outdoor lighting replaced its time-sharing service with an inhouse minicomputer system.

A decade ago, Wide-Lite, one of the world's largest companies in its field, estimated lighting requirements manually. Using pencil, paper and a slide rule, an engineer would make two calculations to determine the efficiency of a lighting system.

The first calculation attempted to specify what percentage of light emitted was actually being used to light an area; the second, which ration of fixture spacing to height provided the most uniform illumination.

This calculation method, used throughout the lighting industry, took hours for each job and its accuracy was only as good as the best estimate, according to Jack Cramer, Wide-Lite's director of computer services.

For a few select customers, Wide-Lite sometimes made a "point-to-point" calculation to show that lighting was uniform at specific points within an area. This calculation gave customers a more precise lighting estimate but was time-consuming and expensive, Cramer said.

Wide-Lite's customer sites have included the Pontiac Silver Dome, home of the Detroit Lions. Lighting design for structures such as the 80,000-seat stadium require complex design and hardware considerations to meet the lighting levels necessary for national television coverage without blinding players or spectators with glare, Cramer explained.

As television sports coverage increased during the last 10 years, precise point-to-point lighting became necessary to ensure clear visibility, and manual approximation methods were no longer good enough, Cramer said.

Used Time-Sharing Service

With the advent of larger lighting jobs, Wide-Lite began using a computer time-sharing service to assess lighting uniformity and visual comfort. Costs proved high and the company used computer time selectively, Cramer noted. Not all calculations could be done and many jobs were still approximated manually, he said.

In 1976, when Wide-Lite moved 160 miles from Houston to its current headquarters, the firm left its service bureau so far away that all computing became "pure remote-job entry (RJE) batch," Cramer said.

"Communications costs were so high we were spending $3,000 a month before work was even done," Cramer said. "Our computing costs ran as high as $20,000 a month, and we still couldn't get all of our work done."

As a result, Wide-Lite started shopping for an in-house system with address space large enough to handle its "huge" programs, Cramer said. "We benchmarked several systems and Prime Computer, Inc. offered the most power for the best price.

"We then contacted a number of users to assess their satisfaction," Cramer added. "They all seemed very enthusiastic about the machine and its reliability. We were impressed and purchased a Prime system."

Wide-Lite operated the system in dual mode with the time-sharing service for a short time after installation, but within six months, Cramer said, 95% of the company's work was with the in-house system. In June 1977, Wide-Lite discontinued the RJE service.

Present Configuration

The current system incorporates a 256K-byte Prime 400 minicomputer with two 160M-byte disk systems, two 45 in./sec tape drives and a DP-8 plotter.

Wide-Lite also uses a 600 line/min printer, a Talos Systems, Inc. 6000 digitizer, graphics terminal and 18 other terminals as well as a Primos operating system with several software modules including Fortran, Cobol, Basic and PMA, Cramer said.

The in-house system has extended Wide-Lite's application engineering services, according to Cramer. "When large numbers of lamps are involved in a job, it's totally impractical to search manually for the single 'best' design solution," he said. "One line of luminaires, for example, offers up to 240 combinations of lamp, reflector and mounting options.

"The system solved this problem for us by giving us more rapid response, higher accuracy and the ability to evaluate almost limitless variations to ensure the best possible lighting job," Cramer said.

In addition, the system maintains a history of all Wide-Lite installations, including application and product design information, Cramer said. It also provides a data base that includes all the complex lighting property data for every fixture in the company's product line.

Using this data base and the digital plotter, Wide-Lite produces engineering drawings that measure point-to-point illumination.

"Being able to produce finished drawings has meant a gain in speed and a reduction in overhead," Cramer claimed. "Without the system, we'd have to hire five or six more draftsmen to design lighting drawings. And instead of keypunching data, we can now produce drawings directly from the digital plotter."

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Avocation Turns to Vocation

Micro Working for Business as Well as Pleasure

SIMI VALLEY, Calif. — Contract bids that used to take Jemco Plumbing, Inc. as long as four hours to estimate now require 15 minutes or less, thanks to a microcomputer business system that company head Jay E. Moss recently installed in his home.

Moss, a confirmed hobbyist with interests in various avocations, originally acquired the system a little more than a year ago as a personal computing "toy," which he soon programmed to outwit him in four-dimensional tic-tac-toe.

Whenever Moss misplays a game, the system taunts its owner with CRT-displayed invectives like, "That was really a stupid move, Jay. I'm going to finish you off in three moves."

About six months after he installed the system, however, Moss "realized its potential for my plumbing contracting business" and had soon adapted the hardware for more serious applications than simple home amusement. Today, in addition to estimating contract bids worth about $2.5 million each year, the computer oversees Jemco's payroll and bookkeeping and prints both invoices and form letters.

The system uses the same information source as Jemco's plumbing equipment suppliers to check the company's supplier invoices.

Accountant Fees Down

Since Moss automated his payroll, Jemco's accountant has lowered his monthly fee by $75/mo, the company head reported. "I've spent about $9,000 on the system in all, and I figure it has paid for itself several times over in this first year alone," he added.

To estimate a contract bid for a residential subdivision or other large-scale construction project, Moss programmed his Altair 8800A system to request answers to a long list of business questions like:

- How many houses of a particular plan are in a tract?
- How many fixtures are in the plan?
- How much does each fixture cost?
- How far apart are the fixtures?

With no human assistance, the computer can also calculate the amount of labor Jemco will need to emplace a home plumbing system because Moss has supplied the machine with years of records showing the typical turnaround time for each of the company's 15 installation steps.

"To check whether the computer's estimates on labor were correct, I took old housing plans from four to five years ago and had the computer estimate them," Moss recalled. "Then I checked those figures with the actual labor and costs, and they were fantastically accurate."

Using all the information Moss has fed it, the system produces an itemized cost estimate for each job, including profit and overhead statements. For a tract with four house plans, a bid estimate takes about 45 minutes to prepare.

"Most small businessmen would probably need only about $5,500 worth of [computer] equipment," he concluded. "But the big thing is that they shouldn't be afraid of using a computer. They don't have to know how a computer works, but how their own business works."

Moss' own experience provides a convenient case in point. When he first became involved with hobby computing about a year ago, "I knew nothing about computers beyond how to spell the word."

His interest in DP began after he read a news magazine article about hobbyists buying computer kits for as little as $400 and assembling small systems that provided as much power as giant computers of a decade ago.

One day after reading the article, Moss and his son went to a computer store and spent $2,700 for the Altair 8800A microcomputer kit and peripherals, both of which are manufactured and marketed by Pertec Computer Corp.'s Microsystems Division.

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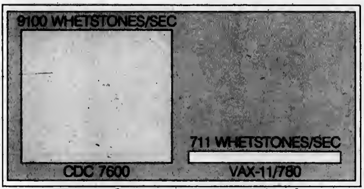

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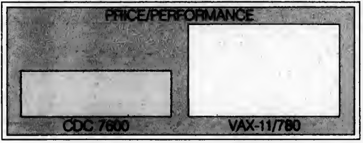

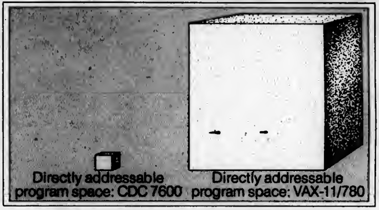

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Micro Chips

'Byte Shopper' Ready for $3.95

TEMPE, Ariz. — The Spring '78 edition of the "Byte Shopper" is now available to users who wish to keep up on trends in the microcomputer industry.

Offered by Microage, the shopper provides a key to system selection and a guide to disk drive selection. Added sections focus on business applications.

The shopper also features an introduction to personal computing, with a glossary of buzzwords and illustrations of how micros work and where they prove useful.

Manufacturers' specifications are combined with a discussion of how to use each product and how it relates to the overall system. A price list is also included.

The 72-page "Byte Shopper" costs $3.95 from Microage, No. 101, 1425 W. 12th Place, Tempe, Ariz. 85281.

Fully Encoded Keyboard Introduced by Maxi-Switch

MINNEAPOLIS — The Maxi-Switch Co. has introduced a fully encoded keyboard called Max that features individual function keys and MOS/LSI encoding with all 128 Ascii characters.

A kit is available for adding cursor keys and a home key.

The company emphasized that the keyboard is not a production overrun or a surplus unit, but a keyboard designed especially for the micro user. It sells for $69.95; the kit costs $3.95 from Maxi-Switch Co., 9697 East River Road, Minneapolis, Minn. 55433.

Chirlian Book Discusses How Computers Work

FOREST GROVE, Ore. — *Understanding Computers,* a book by Paul M. Chirlian, was written for people who use small computers, who are thinking of using them or who are just interested in small computers, according to the book's publisher, Dilithium Press.

The book discusses all phases of computer development, the binary system, elements of a computer and elementary and high-level languages.

The book costs $8.95 from Dilithium Press, P.O. Box 92, Forest Grove, Ore. 97116.

Five-Minute Tapes Offered by Microsette

SUNNYVALE, Calif. — Microsette Co. has unveiled short-length, high-level audio tapes and cassettes.

The 50-ft long C-10 Microsette which provides approximately five mintues' recording time per side, is suited for short programs, according to the company.

The tape costs 48 cents in quantities of 100 from Microsette Co., 777 Palomar Ave., Sunnyvale, Calif. 94086.

Accepts, Relays Messages

Hobbyists Start Bulletin Board

By Ann Dooley
CW Staff

CHICAGO — Two hobbyists have started a computerized bulletin board system (CBBS) that accepts and relays messages from anywhere in the country via phone lines whenever a caller requests or delivers information.

Ward Christensen and Randy Suess, who designed and installed the CBBS, consider it a definite success. More than 1,500 users — one from as far away as Anchorage, Alaska — have called into the system, and hundreds of messages have been "posted" and picked up since the system began in January, according to Christensen.

The CBBS was begun as a way to generate material for a club newsletter; it was designed, built, programmed and tested in 30 days, Christensen said.

The typical kinds of messages left on the bulletin board include club activities, items for sale, hobbyist-related events, job offers,requests for technical assistance and technical tips as well as instructions for getting equipment to work, recommendations of microcomputer kits and personal messages.

A caller uses the system by dialing (312) 528-7141, connecting the modem and pressing "return" several times until the CBBS determines the speed at which the caller's system is running. The system first welcomes the caller, inquires whether this is the caller's first time on the system and then asks the caller's name and location for recordkeeping purposes.

The CBBS next lists the caller's number and the functions available. The user can leave or pick up a message or simply scan all the messages for any of interest.

System Capabilities

The system can print a bulletin, switch to upper and lower case characters, switch duplexes, enter messages into the system, print hello and good-bye, help with functions, kill a message and retrieve or summarize messages.

The billboard system can also scan the entire listing of messages for certain topics, such as items for sale. When a caller phones in with a message, the system assigns it a number and enters the date it was left, the name of the sender and whether it was meant for anyone in particular.

The message itself can be up to 16 lines of 60 characters.

The system's three major func-

(Continued on Page 74)

RCA Reduces VIP Price, Cuts Availability of Kit

LANCASTER, Pa. — The price on the fully assembled RCA Video Interface Processor (VIP) home computer has been reduced to $249 from $299.95.

The price cut was made possible by an increasing production volume and by declining costs for the 4K static random-access memory (RAM) used in the VIP, according to Richard Simpson, VIP product marketing manager.

RCA will emphasize availability of the fully assembled home computer, Simpson said. The previously available kit version will only be offered on special arrangement, because RCA is trying to "eliminate the frustrations and perplexing problems that might be inherent in a novice's efforts to assemble a kit," he explained.

The VIP is a microcomputer based on the RCA Cosmac (CDP1802) microprocessor. It was designed to interface directly with CRT monitor or modified TV set.

It is provided with an interpretive language which makes it "easy for the user to write graphic games and other applications without having to learn machine language," the vendor said.

The VIP contains a 16-key keypad for entering programs and has a built-in audio cassette interface to permit storing programs on a cassette. Documentation provided with the VIP contains listings for 20 games for use on the system.

Further information is available from RCA at New Holland Ave., Lancaster, Pa. 17604.

Floppy Disk Subsystem Offered to Apple Users

CUPERTINO, Calif. — Apple Computer, Inc. has unveiled Disk II, an intelligent peripheral for the Apple II microcomputer.

The Disk II was designed for use in home applications such as address files, appointment calendars and recipe files as well as personal financial record storage or stock price storage.

With the disk, an Apple II business user can reportedly handle inventory, general ledger, payroll and other business functions, according to the firm.

Disk II's disk operating system enables the user to find and load any file by name with a single command, the firm said. The software provides dynamic disk space allocation as well as compatibility with existing languages through Basic commands, a spokesman noted.

The Disk II subsystem consists of an intelligent interface card and one or two minifloppy drives. The computer will handle up to seven controller cards and 14 drives for access to more than 1.6M bytes of data.

The combination of a bootstrap loader in read-only memory (ROM) and operating system in random-access memory (RAM) provides disk handling with full disk capability for systems with only 16K bytes of RAM, random and sequential access, automatically generated file name directories and storage capacity of 116K bytes per diskette.

Other features include the ability to be driven from its processor's power supply with no other power required, and a patented design said to reduce power consumption and motor wear while permitting the drive mechanics to operate at higher speed.

Disk II costs $495 including the controller card and the Disk II drive from Apple Computer, 10260 Bandley Drive, Cupertino, Calif. 95014.

New York Coliseum Set As September Show Site

NEW YORK — The Second Annual Personal & Business Small Computer Show scheduled for Sept. 15-17 in the New York Coliseum will include lectures of interest to business and professional people, hobbyists and the general public.

The show will feature a seven-phase lecture series covering introductory material on such topics as hardware and software systems, small business and professional applications, recreational and household applications and educational applications, in addition to a computer retailing workshop.

Admission to the show, which drew 13,388 attendees last year, is $5 per day at the door. Nonrefundable two-day admissions at $9 and three-day admissions at $13 can be purchased until Sept. 4 from Personal & Business Small Computer Show, 78 East 56 St., New York, N.Y. 10022.

In addition to the lectures, Sybex and the Institute of Electrical and Electronics Engineers (IEEE) will offer tutorials. More information is available from Sybex at 2020 Milvia, Berkeley, Calif. 94704 and from IEEE through D.R. McGlynn, 71 N. Moger Ave., Mt. Kisco, N.Y. 10549.

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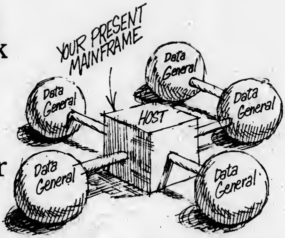

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Debugger Designed for 6500

AMES, Iowa — Computer Applications Corp. (Compas) is offering the DB/65, a stand-alone debug system for the 6500 microprocessor from MOS/Technology, Synertek and Rockwell.

The programmable read-only memory (Prom)-resident DB/65 monitor includes hardware breakpoint, eight software breakpoints, real-time software breakpoints, symbolic disassembly of user programs, program trace of instructions and registers, scope synch output, single step and a software stack of instruction addresses.

The DB/65 comes with 2K of static random-access memory (RAM) with sockets for an additional 6K of RAM. It will support any standard RS-232C or current-loop terminal with speeds of 110- to 9,600 bit/sec, Compas said.

The DB/65 costs $1,450 from Compas, 413 Kellogg, Ames, Iowa 50010.

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(205) 533-3165

AIS Has Operating System For Single-Disk Micros

PHILADELPHIA — Advanced Interactive Systems (AIS) has unveiled SOS, which it said is the first complete operating system for single-disk, limited memory microcomputer systems.

The SOS-resident monitor is 1.5K bytes long and provides program development facilities using a single IBM format 8-in. floppy disk and at least 8K of random-access memory (RAM).

The SOS editor is a character-oriented context editor which includes edit macros and block move capabilities. The assembler will assemble a 1,000-line source program from disk in 30 sec, the firm claimed.

The SOS text output processor accepts "runoff" syntax and, in conjunction with the editor, provides word-processing capabilities. SOS Basic supports one- or two-dimensional arrays, strings, user subroutine calls, sequential file access, integer arithmetic and graphics, AIS said.

All system facilities are invoked by direct commands, the firm said. SOS runs on any 8080, Z80 or 8085 system with RAM.

SOS, priced at $50, is available from AIS, 8216 Pickering St., Philadelphia, Pa. 19150.

Pro-Log Memory Cards Offer 16K-Byte Capacities

MONTEREY, Calif. — Two edge-connected memory cards with word capacities up to 16K 8-bit bytes have been introduced by Pro-Log Corp.

The Model 8119 random-access memory (RAM) card implements address decoding for 32 IBM 2114-type static MOS RAMs for use in 8-bit microprocessor systems. Expansion to full capacity is in 1K-byte increments.

The Model 8120 read-only memory (ROM)/RAM card implements up to 16K bytes of 2716-type erasable programmable ROM (Eprom) and 2K bytes of 2114-type RAM. This card is organized so the RAM can be located as either the first or last 2K bytes on the memory board.

Memory increments up to the maximum are in 2K byte-segments, the spokesman said.

The price of the 8119 16K RAM card without memory is $95 or $60 in quantities of 100. The 8120 ROM/RAM card, also without memory, sells for $120 or $70 in 100-unit quantities.

Pro-Log is at 2411 Garden Road, Monterey, Calif. 93940.

Turnkey Develops Programs

BEDFORD, Mass. — Aivex, Inc. has unveiled the Umax microprocessor development system, an integrated turnkey system for developing microprocessor programs.

The Umax features a Digital Equipment Corp. LSI-11 with 20K of memory, an LA36 Decwriter, M9200 programmable read-only memory (Prom) programmer, dual flexible disk system and various software components, according to the firm.

The development system costs $1,695 from Aivex, Inc., 6 Preston Court, Bedford, Mass. 01730.

Two Start 'Bulletin Board'

(Continued from Page 71)

tions are to summarize a message in two lines, to enter the message and retrieve it. It usually carries about 200 messages; when it reaches 300, the outdated cones are erased by Christensen.

The system also includes a password so that if a message is left for someone in particular, only that caller will be able to retrieve it. Once the message has been retrieved, it also can be erased by using the password. Every other file in the system is open to public access.

The system is meant to be handled by a novice user, but won't slow experts down by requiring them to type too much either, Christensen said.

The major complaint is that there are not enough phone lines and callers can't always get through. Having only one phone line is a problem, he admitted, but right now the system just can't support any more.

Although the operation didn't start out as a commercial package, clubs in Atlanta, Ga., and Santa Clara, Calif., have bought the software from Christensen for $50.

The system itself is based on a Vector 1 S-100 8080 CPU with 24K of memory, a single floppy disk operating system called CP/M from Digital Research Co. of Pacific Grove, Calif. and a modem board. It cost approximately $2,500.

No complex protocol is used on the system; almost any 110- or 300 bit/sec Ascii terminal and modem can access the system, according to Christensen. The software was prototyped in Basic and written in Assembler.

Carnegie-Mellon Sets Five-Day Workshop

PITTSBURGH, Pa. — Carnegie-Mellon University will hold a five-day microcomputer workshop Oct. 9-13 on the university campus for individuals with a "serious interest in applying micros systems to practical problems."

The course will feature lectures on the concepts and techniques of microprocessor systems and 12 hours of "hands-on" problem-solving.

Additional information is available from Post College Professional Education, Carnegie Institute of Technology, Carnegie-Mellon University, Schenley Park, Pittsburgh, Pa. 15213.

As Distributed DP Spreads

High-, Low-End Minis on Rise in Japan

By Marcia Blumenthal
CW Staff

TOKYO — The Japanese minicomputer market is expected to surge ahead, with high- and low-end machines leading the way as users increasingly accept distributed DP, according to *EDP/Japan Report* (EDP/JR), a publication of International Data Corp.

Minicomputer shipments totaled only 2,966 units in 1976, according to a survey done by the Ministry of International Trade and Industry (Miti), but are expected to reach the 11,000-unit mark by 1981.

A moderate but steady annual growth rate of 22% is expected between now and 1981.

A breakdown of mini shipments by class revealed that more than 95% of the shipments during fiscal 1975 were traditional-type minis, primarily competing with the Digital Equipment Corp. PDP-11/04 through 11/40.

However, the product mix of superminis (defined as those in the PDP-11/70 range) traditional minis and "microminis" (in the DEC LSI-II/PDP-8A class) is expected to show a dramatic change, according to Miti, with the emphasis on the high and low. Miti estimated that by 1981, superminis will account for 13% of the units shipped and microminis 44% of shipments

Tax Administration Net

One encouraging development for minicomputer suppliers is the on-line network system being set up by the National Tax Administration Agency. The $260 million system, expected to be completed by 1985, will consist of nearly 100 superminis installed as distributed processors at 11 regional tax administration bureaus and selected district tax offices, EDP/JR reported.

The prototype system is now under construction and is expected to start experimental operation connecting several small cities near Tokyo.

The prototype system consists of several DEC PDP-11/70s employed as node processors, which will be connected to a large-scale Nippon Electric Co. (NEC) Acos series CPU. EDP/JR reported that its informed sources indicated the DEC superminis are being used primarily so that DEC's advanced data base management and time-sharing software can be studied.

Moreover, that decision is said to be based on the government's open-market policy on foreign-made computers in the public sector of the market.

The movement toward mini-based network systems is also expected to extend into the private sector, EDP/JR said. Progressive large manufacturing firms and banking institutions will be a large market sector.

Although major minicomputer suppliers such as DEC, Hewlett-Packard Co. and Data General Corp. will have a head start in the supermini race in Japan, EDP/JR reported that domestic computer makers, formerly concentrating on mainframes, appear to have finally decided to join the supermini race.

Toshiba Has Mini

Earlier this year, Toshiba announced its Tosbac Series 7/70 supermini. NEC has been marketing the Neac MS 30/50 minis which EDP/JR said are perfect counterparts to the Honeywell Information Systems, Inc. Series 60 Level 6 minicomputers.

Other mainframe makers, including Fujitsu Ltd. and Hitachi Ltd., have yet to enter the supermini market, but according to EDP/JR they are engaged in vigorous R&D.

The report noted that as the minicomputer market begins to take off, manufacturers are faced with two major problems: conflict with existing general-purpose mainframe lines and difficulties in carrying out unbundling policies.

International Conferees Form Committee to Continue Talks On Transborder Data Problems

By Marcia Blumenthal
CW Staff

MONTVALE, N.J. — A commitment to continued dialogue on the problem of transborder data flow was a major outcome of the First World Computing Services Industry Congress held in Barcelona, Spain, recently.

Currently, transborder data flow problems have resulted in difficulty in incorporating businesses in some countries, particularly France, Mexico and Japan. This has had a notable impact on the expansion of U.S. service firms, according to J.L. Dreyer, executive vice-president of the Association of Data Processing Service Organizations, Inc. (Adapso).

Because of this problem, Dreyer said, Adapso members went to the meeting with a less-than-optimistic view. The lack of optimism resulted from the general opinion that often transborder data flow is used as a political maneuver by some countries to set up invisible trade barriers. This issue was not a major problem when the idea for the international meeting was hatched 2-1/2 years ago, Dreyer noted.

Partnership Needed

Dreyer said the political environment in some countries has presented obstacles to American companies incorporating in a particular country. For instance, in France, a U.S. company must have a partnership with a French national company in order to incorporate.

While France, Japan and Mexico have been the most recalcitrant countries, Dreyer pointed out that Canada recently passed a law requiring a government review before a U.S. service firm can establish a business in Canada. The reviews require foreign businesses to show what benefit they will provide to Canadian nationals.

On the surface, transborder data flow appears to be a privacy issue, and at the present time, the U.S. government has no intention of interfering in the private sector, he said.

Adapso has espoused industry self-regulation. "Privacy is not the responsibility of the DP service company; it is the responsibility of the customer to protect the data given to the DP organization. Our job is to secure that data while it is in our hands," Dreyer explained.

International Committee Set Up

As a result of the discussions held on the transborder flow issue at the first international industry meeting, a committee made up of associations from various countries was established.

The mandate of this international committee is to exchange documents and share ideas about the policies on transborder data flow that come out. within the borders of the countries participating on the committee.

Since the idea for the gathering was hatched 2-1/2 years ago, Adapso and the Computer Service Association, Adapso's counterpart based in London, have been planning the conference.

There were 26 nations represented and 700 delegates attended the conference.

Dreyer noted the conference consisted primarily of small sessions on topics such as privacy and nuts and bolts sessions that discussed competing with small business computers and how to develop a software package.

Another international meeting is anticipated within the next three years.

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Milacron Decides to End, Not Sell, George Line

By Marcia Blumenthal
CW Staff

CINCINNATI — Cincinnati Milacron, Inc. decided last week to continue producing its George line for its existing distributors only for the next two years.

The decision came in the aftermath of the disappointment experienced by distributors four weeks ago when they learned of Milacron's sudden decision to phase out the small business system line. Milacron had previously planned to sell the George line to CSD International Corp., a company to be composed primarily of former employees [CW, May 29].

Wayne Sennett, formerly manager of Milacron's Computer Division and now president of CSD, said he was baffled by CM's rigidity in not extending the 41-day time limit for the consummation of the sale.

Milacron's refusal to alter the terms of the letter of agreement with CSD is believed to have been the event precipitating the company's notification to distributors that it would discontinue the George line.

Distributors Unhappy

In commenting on the decision, Paul Pierce of Modern Business Systems, a distributor of the George small business system, said Milacron should have made a longer commitment in light of the investment distributors have made in the equipment and its support, he remarked.

The Jefferson City, Mo., business products firm has been a distributor of computer systems only since last October. It carries the George line exclusively and has installed 10 systems to date.

"We went through a tremendous effort to develop software for the machine; it has no value for any other computer. This is worse than starting over again," Pierce complained.

Moreover, he said, he learned about the phaseout only one day before the news was published in *The Wall Street Journal*.

A West Coast distributor who claimed he had a contract with Milacron for longer than two years stated he would do all he could to assure that Milacron lived up to its end of the bargain. He also expressed disgust at the way the announcement was handled.

Little to Say

Milacron executives had little to say about the reaction of the distributors or the decision not to sell the George line to CSD.

Herb Fuldner, manager of the Electronic Systems Division, under the direction of Clifford Meyer, group vice-president of the Machine Tools and Electronic Systems divisions, had the responsibility of working out the arrangements with the distributors.

Prior to Milacron's final decision, Fuldner told *Computerworld* the distributors were disillusioned. At that time, however, he was hopeful the company would be able to assure the distributors of Milacron's intention to supply hardware and operating software for a reasonable length of time.

The distributors were not the only ones disillusioned. CSD's Sennett said he didn't understand why Milacron would not extend the 41-day time limit for the completion of the sale.

In particular, Sennett claimed Milacron did not provide CSD with information concerning the inventory level and fixed assets early enough to allow the bank to make its decision on financing the company before time ran out.

"We were given the fixed asset list 24 hours before we had to complete the transaction," Sennett noted.

When asked if he thought Milacron was deliberately trying to squelch the deal, Sennett responded that he could not fathom Milacron's motivations.

He did note, however, that Milacron was in a hurry. After the announcement of the sale to CSD, Sennett said, Milacron experienced faltering sales and unrest among some of its distributors.

Milacron's Meyer said he did not care to comment on the matter other than to say "we signed a letter of agreement with all the details, including price and time of closing, which both parties signed . . . Unfortunately we could not consummate the deal."

When asked why the time for the sale could not be extended, Meyer said he was not at liberty to comment.

Sennett and his staff were laid off by Milacron on June 23. Despite the setback, CSD is forging ahead, Sennett said, working on developing a small business system of its own. The original strategy was to continue the George line, bringing out a compatible system which would have been an upgrade.

The prospect of CSD's picking up the George line now is remote, Sennett said, because at this point confidence among end users and distributors is at its lowest. "It would be like buying an RCA computer after RCA announced it was going out of business," he observed.

Relations with Milacron are not dead — the two companies are talking. Recently, according to Sennett, Milacron approached CSD to explore the idea of CSD's supplying a compatible system.

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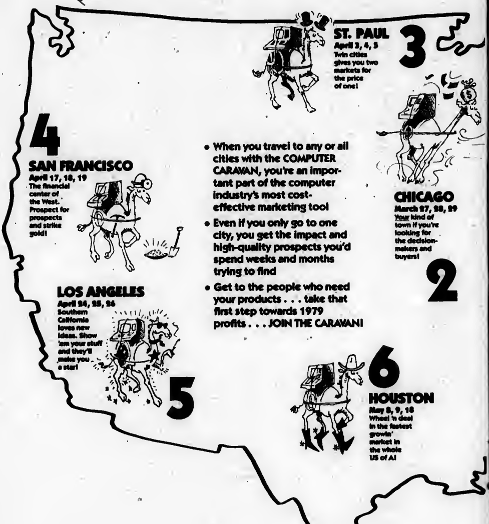

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Ex-IBMers Wanted

SAN LUIS OBISPO, Calif. — A study is under way of former IBM sales and technical employees who resigned from the General Systems Division (GSD) or Data Processing division (DPD) prior to normal retirement.

Conducted by Dr. Milton Drandell, professor of management at California Polytechnic State University here, the study will examine the opinions of these former employees. In particular, Drandell will focus on the ex-IBMers' opinions related to IBM management and its employee policies and practices during the time of employment as well as their attitudes toward IBM today.

A former IBM employee who worked in DPD for 15 years, Drandell said his students were continually asking him what working for IBM was like. Drandell decided the best answer to that question could be found by studying former employees.

In order to gain a balanced view of the attitudes of the former employees, Drandell chose to interview both sales and technical support personnel because he thinks they tend to look at an organization in different ways.

Drandell encourages former employees of GSD and DPD to participate in the study. They can reach him by writing to P.O. Box 709, San Luis Obispo, Calif. 93406.

Respondents will be given complete anonymity, Drandell said.

Northern Telecom Makes Surprise Offer for Data 100

MONTREAL — Northern Telecom Ltd. said it will make a tender offer of $20 per share for all the outstanding common shares of Data 100 Corp. stock it doesn't already own.

The offer, a counterbid to the $17.50 a share offered by McDonnell Douglas Corp.in May, came as a surprise to both McDonnell Douglas and Data 100. McDonnell Douglas had earlier announced an agreement in principle to merge Data 100 into it.

In commenting on the sudden counteroffer, a McDonnell Dougals spokesman said, "During negotiations with Data 100 of a definitive merger agreement, McDonnell Douglas had arrived at a substantial agreement with Northern Telecom concerning the acquisition of its Data 100 stock."

Although McDonnell Douglas will not make a counteroffer, the company, according to the spokesman, still has an interest in making significant acquisitions in the terminals sector of the computer industry.

A Matter of Value

"It's a matter of value," Robert Scrivener, Northern Telecom's chairman and chief executive officer, said succinctly. Scrivener denied there was any motive other than financial for making the unexpected counteroffer, claiming the McDonnell Douglas offer just wasn't adequate.

Northern Telecom made its first counterbid of $19.25 per share on June 30, then raised the ante to $20 per share on July 6.

Data 100 said its board of directors has already voted to recommend acceptance by the company's shareholders of the proposed tender offer. Aside from the financial attractiveness of the offer, a Data 100 spokesman said the company is impressed with the stated corporate strategy of Northern Telecom to build the office of the future.

Merger With Subsidiary

Northern Telecom currently owns 31% of Data 100's common stock and has an option to boost its holdings to 35% of the outstanding shares.

Following the completion of the tender offer, Northern Telecom said it intends to propose a merger of Data 100 with one of its subsidiaries. Northern Telecom indicated it will retain Data 100's current management; it intends to enter into employment contracts with senior management as soon as the proposed merger is completed.

IBM Studying Service Abroad

ARMONK, N.Y. — IBM is conducting a study designed to discover how the company can best serve its customers in the countries where it operates. The study will focus on whether allowing greater self-sufficiency to business units would accomplish the objective of better service.

Among the possible organizational changes under study is the establishment of the General Business Group (GBG) as a worldwide subsidiary, wholly owned by IBM.

In announcing the study to employees, IBM Chairman Frank T. Cary said, "Our goal is to make the company more responsive to our customers and to take advantage of opportunities for growth.

"We have taken a number of steps in this direction in the past few years. In 1974, we established two World Trade operating subsidiaries, the Europe/-Middle East/Africa Corp. and the Americas/Far East Corp. In 1975, we structured GBG on an international basis."

The study, being done on an in-house basis will take several months to complete and will include the U.S. and the 21 countries that have GBG organizations.

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Nickels & Dimes

Computerized Automotive Reporting Service, Inc. announced a quarterly common stock dividend of 6 cents per share payable on July 17.

$$$

Bolt, Beranek and Newman, Inc. declared a semiannual dividend of 10 cents per share payable Aug. 31.

$$$

Centronics Data Computer Corp. signed a financing agreement for borrowing up to $30 million. The proceeds will be divided evenly between a seven-year fixed-rate term loan and a revolving credit loan and will be used to repay existing short-term loans and for general corporate purposes.

$$$

Information International, Inc. (Triple-I) posted losses in both revenues and earnings for its fiscal year ended April 30.

Revenues for 1978 dipped to $13.1 million with earnings of $1.3 million or 50 cents per share compared wtih 1977 revenues of $15.1 million with earnings of $2 million or 76 cents per share.

The reduction in revenues and earnings was a temporary condition arising from the transition to new models of the company's typesetting and microform recording systems, according to president A.L. Fenaughty.

Fourth quarter 1978 revenues above the corresponding period a year ago and a record backlog point to renewed growth, Fenaughty said.

$$$

Applied Digital Data Systems, Inc. has declared a quarterly dividend on its $1 cumulative convertible preferred stock. The 25 cent dividend is payable July 26.

$$$

Telenet Corp. has completed a public stock offering of 400,000 shares for a total of $4.9 million in new equity financing.

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Computer Automation, Inc. has secured a $15 million credit line — a $7.5 million term loan and a $7.5 million revolving credit line — will be used to finance current corporate expansion and growth programs.

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Strong Fourth Quarter

Mohawk 1978 Earnings Double

PARSIPPANY, N.J. — Earnings for fiscal 1978 for Mohawk Data Sciences Corp. before extraordinary items were $5.5 million or 72 cents per share, doubling 1977 earnings of $2.6 million or 35 cents per share.

Revenues for the year totaled $152.6 million vs. $146 million in 1977.

Fourth quarter earnings of $1.7 million or 23 cents per share represent a 74% increase over earnings of $1 million or 13 cents per share for the comparable quarter of 1977.

Fourth quarter revenues were $40.9 million compared with $35.1 million for the corresponding period a year ago.

Operating margins for the year increased about 23% while revenues increased only 4%. Earnings for 1978 were enhanced by a better mix of products and improved factory efficiencies, the company reported.

In addition, lowered interest expense and reduced currency translation losses improved margins.

Ralph H. O'Brien, chairman and president, said, "A major factor contributing to earnings gains was the improvement in U.S. operating results. We are also pleased by shipments of Series 21 systems, our newest line of distributed processing products, which have continued to grow at an accelerated pace."

As of April 30, the backlog totaled $150 million vs. $134.8 million on Jan. 31, an increase of 12%. "Series 21 accounts for a substantial portion of this increase in backlog," O'Brien explained.

Financial News

Data Terminal Gains Listing on NYSE

MAYNARD, Mass. — Data Terminal Systems, Inc. (DTS) was accepted for listing on the New York Stock Exchange beginning June 14. The company was previously listed on the American Stock Exchange.

At the recent annual meeting, company executives announced five new products, and the board of directors voted a semiannual dividend of 10 cents per share payable July 31. DTS paid its first cash dividend of 10 cents per share in January.

First quarter 1978 resulted in earnings of $2.5 million or 52 cents per share compared with $985, 143 or 21 cents per share in the first quarter a year ago.

Revenues for the quarter were $13.6 million, a 70% increase over first quarter 1977 sales of $8 million.

DTS recently introduced three new models of its 200 series which should significantly expand the size of the under-$2,000 market available to DTS, the company said.

In addition, the company recently announced a new Model 441 system for supermarket, discount and drug center applications that offers a large memory capacity and management reporting features valuable in high-volume applications.

The fifth new product is a Model 450 system for various retail applications. It is the company's first complete stand-alone inventory control system.

Dr. Robert F. Collings, DTS president, told shareholders that K-Mart had awarded DTS a "substantial" order for electronic cash registers.

Since its founding in 1970, the company has shipped 80,000 electronic cash registers worldwide.

Earnings

DATA CARD
Year Ended March 25

	1978	a1977
Shr Ernd	$.66	$.63
Revenue	33,923,000	20,993,000
Earnings	2,323,000	1,461,000
3 Mo Shr	.33	.23
Revenue	10,430,000	6,746,000
Earnings	676,000	551,000

a-Includes results of UK subsidiary from date of acquisition in October 1976 on a purchase basis.

DATAPOINT
Three Months Ended April 30

	1978	1977
Shr Ernd	$1.08	$.60
Revenue	42,193,000	26,276,000
Earnings	3,999,000	1,948,000
6 Mo Shr	2.65	1.84
Revenue	114,519,000	73,109,000
Earnings	10,411,000	6,026,000

DATA TERMINAL SYSTEMS
Three Months Ended April 30

	1976	1977
Shr Ernd	$.52	a$.21
Revenue	13,609,560	6,068,229
Earnings	2,507,789	985,143

a-Adjusted for a three-for-one stock split paid in January 1976.

DELTAK
Three Months Ended April 30

	1978	1977
Shr Ernd	$.05	a$.07
Revenue	2,319,950	1,802,321
Earnings	46,371	72,076
9 Mo Shr	.12	a.17
Revenue	4,653,936	3,363,322
Earnings	114,766	172,163

a-Adjusted for a three-for-one stock split in January 1978.

HEWLETT-PACKARD
Three Months Ended April 30

	1976	1977
Shr Ernd	$1.23	$1.13
Revenue	416,200,000	341,600,000
Earnings	35,700,000	32,100,000
6 Mo Shr	2.37	2.06
Revenue	783,400,000	639,600,000
Earnings	68,200,000	58,200,000

MICROFORM DATA SYSTEMS
Three Months Ended April 26

	1976	1977
Shr Ernd	$.06	$.09
Revenue	9,284,400	6,145,600
Spec Cred	160,300	199,100
Earnings	344,200	364,600
9 Mo Shr	.28	.08
Revenue	25,795,100	15,737,000
Spec Cred	759,700	250,600
Earnings	1,610,600	510,000

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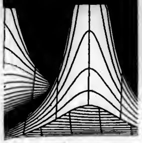

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EEOC Must Pay Datapoint for 'Frivolous' Suit

SAN ANTONIO, Texas — A federal appeals court judge ordered the federal Equal Employment Opportunity Commission (EEOC) to pay Datapoint Corp. $66,540 plus interest for legal fees the company spent defending itself against a groundless and "frivolous" suit.

The appeals court's final ruling came more than two years after a district court awarded Datapoint $80,000. At that time the district court also stipulated the EEOC would have to pay Datapoint another $10,000 if EEOC appealed the case, which it later did.

The original case dates back to 1974, when a Datapoint employee attempted to have her suit against the company categorized as a class action suit for discrimination. EEOC subsequently took on the challenge, filing "a pattern of practice class action suit," the spokesman noted.

Original Charges

The suit brought by EEOC charged the company had engaged in "across the board" discrimination against blacks, Mexican-Americans and women employees, former employees and job applicants.

On the day of the 1976 district court trial, EEOC dropped 90% of the charges, according to the Datapoint spokesman.

Asked on what basis EEOC brought the original suit, the spokesman said, "When EEOC was firing up its operation, its first approach was to move on high-profile firms — those companies setting an example in the community." At the same time, the federal agency also filed suits against several other firms and public agencies within the San Antonio area.

In writing the final judgment, Judge John H. Wood Jr. termed EEOC's suit "frivolous and groundless" and said "the entire case was brought unreasonably and in bad faith."

In Washington, an EEOC attorney said the agency would not comment on the judgment until it had a chance to review the court papers. However, she did say "the suit was brought in good faith."

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- Application Analysis Methods (2½ days)
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F&S: Manufacturing Graphics Growing 22%

NEW YORK — Computer graphics equipment, software and services geared to U.S. manufacturing industries are expected to grow at a compound rate of 22% annually through 1986, according to a recent survey released here by Frost & Sullivan, Inc. (F&S).

The study, "Computer Graphics and Manufacturing Markets and Technology," forecast that revenues of $316 million in 1978 will more than treble to $1.5 billion by 1986. Certain product sectors — digital TV and large screen displays, turnkey systems and software — are predicted to grow even faster than the 22% rate.

The study was confined to manufacturing industries and does not treat the military or consumer computer graphics market.

Currently about 90% of computer graphics systems in the manufacturing sector are accounted for by seven industry classifications: electrical and electronics machinery, petroleum and refining machinery, measurement and analytical instruments, transportation, ordinance chemical and other machinery.

By 1986, fabricated metals products, food, printing and publishing will be four other industrial classifications added to the list, F&S noted.

Growing Interest

These eleven industries collectively will account for 70% of all computer graphics used in manufacturing, the study predicted. Many additional but scattered industries will latch on to the technology, the report indicated, adding that applications for business analysis and planning and image processing are promising.

This growing interest in computer graphics is providing additional markets for the 110 vendors currently manufacturing this type of equipment.

Fueling the interest are major software developments that include new packages and picture languages that have been introduced over the last decade, the report noted. The study predicted a 25% annual gain through 1986 in the dollar volume of packages sold to manufacturing industries.

Hardware developments are also helping to create a boom environment because of rapidly decreasing costs for memory, digital logic and computational power.

Digital TV Displays

Digital TV displays, according to F&S, will be the major beneficiary of the new technology, with sales projected at $16 million this year and soaring 20-fold to $312 million by 1986.

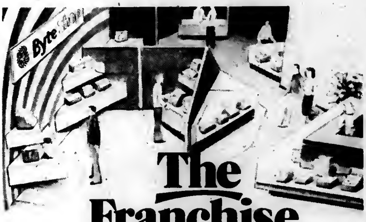
Digital TV monitors, besides being low in cost, generate displays brilliant in color and perform selective erases. "With the advent of microprocessors and greater memory density, inroads of digital TV into the marketplace is assured," the study concluded.

The success with digital TV, however, will have an adverse impact on storage tube-based displays, the study suggested. This category will grow modestly for the next two years, dropping off slightly and remain relatively flat at $30 million annually through 1986.

The turnkey systems market, where hardware packaged with software sells for about $150,000, is also a growing market. Its 1977 volume of $68 million was projected to increase to $481 million by 1986.

The vendors participating in the market show an interesting mix. Hughes Aircraft Corp. and Princeton Electronics Corp. virtually split the scan converter business; Magnavox Display Systems is the principal plasma panel supplier; Summagraphics Corp., closely followed by Talos Systems, Inc., controls graphic tablets; and Versatec, Inc. dominates electrostatic plotters, the study said.

The study is available from F&S at 106 Fulton St., New York, New York, 10038.



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Acquisitions

Dictaphone Corp. has agreed to acquire **Econo-Pak Register Co.** of Lenexa, Kan. The company will operate as a unit of the Data Documents Division. Terms of the acquisition were not disclosed.

HBE Corp. has acquired the **DP Division** of Harrison H. Halbe & Co. The division will be renamed **HBE Data Services** and will operate as a division of HBE Corp.

Comshare, Inc. has acquired **Trust Management Systems, Inc.** of Charlotte, N.C, for 36,216 shares of Comshare common stock and $66,531.

United Telecommunications, Inc. and **Calma Co.** have signed a definitive agreement for the acquisition of Calma by United Telecom. Under the terms of the agreement, subject to the approval of Calma stockholders, United Telecom will acquire all of the issued and outstanding shares of Calma common stock on the basis of 1.43 shares of United common stock for each share of Calma common stock.

Bowers Engineering Co., a data systems, consulting and electronic engineering firm, has acquired **Davis & Associates**, a management consulting and engineering firm.

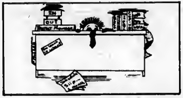
Carlson Park Associates, a real estate partnership, has acquired the Rochester, N.Y. **manufacturing facility** of Stromberg-Carlson Corp. The partnership purchased the plant for $1.5 million with a commitment to expend $600,000 to $800,000 for utility improvements and changes withinin six months.

Honeywell, Inc. and **Spectronics, Inc.** have agreed in principle for the merger of Spectronics into Honeywell. The agreement provides that each share of Spectronics common stock be converted into .4329 share of Honeywell common stock. The transaction has been approved by both companies' boards of directors and is now subject to the approval of holders of two-thirds of the Spectronics shares.

Florida Software Services, Inc. has purchased the **Computer Services Division** of the Pan American Bank of Orlando, Fla.

ICE, Inc., a systems maintenance service company, has acquired the **Computer Equipment Maintenance Group**, Diversified Numeric Applications Division, Avnet, Inc., New York. The value of the transaction was not disclosed.

Periphonics Corp. has acquired **American EFTS Corp.**, a point-of-sale terminal company based in San Carlos, Calif.



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But Others Making Inroads

IBM Leading DP 'Petrodollar' Mart in Arabia

By Bohdan O. Szuprowicz
Special to CW

Although no one is sure how many computers there are in Saudi Arabia, most observers agree that IBM has been there for the last 20 years and that NCR Corp. is hot on IBM's heels in that exploding petrodollar computer market. In fact, NCR claims it has more computer installations in Saudi Arabia and several other Arab countries than IBM has, but IBM is ahead in total petrodollar value of its equipment in operation.

NCR's manager in Jeddah, Wolfgang R. Dalichal, recently interviewed by an Arab newspaper, estimated there are at least 150 computer installations in the Kingdom of Saudi Arabia and the figure is growing rapidly. Of those, about 60 are NCR minicomputers while one-third of the total are large- and medium-scale machines.

He also pointed out that there are already another 400 accounting machines in use in Saudi businesses and offices. These clearly represent a ready-made market potential for upgrading to small business computers and other minicomputer systems.

Already Digital Equipment Corp., Hewlett-Packard Co., Wang Laboratories, Inc., Siemens and Olivetti Corp. are bumping into each other prowling the alleyways of Arab cities trying to discover the locations of prospective end users, who often like to keep a low profile and only identify themselves by post office box numbers. As one British computer promoter quipped after a frustrating foray into Arab lands, "How do you take a cab to a post office box?"

Nevertheless, IBM can boast the most prestigious computer installation in Saudi Arabia at Aramco in Dhahran. The DP department of the oil giant operates its own IBM 370/158 with 4M bytes of memory and leases an IBM 370/168 with another 8M bytes.

The Aramco computer center performs numerous tasks ranging from personnel payrolls and seismic data reduction to oil shipping and port utilization analysis, electric power generation and distribution monitoring.

The center reportedly is the largest of its kind outside the U.S. and Europe and is probably the largest computer center in the Middle East. This is underscored by the fact that about 50 out of a total of 80 IBMers in Saudi Arabia are assigned to that area and their responsibility is to make sure the center runs as smoothly as possible, no matter how blinding the sandstorms of the Saudi desert get. Fine sand blown by desert windstorms is apparently a real and constant hazard to computer operations in the Arabian peninsula.

Equipment Sources

Because there is no domestic hardware production in Arab countries, all DP equipment demand must be met by imports from abroad, and lurking among the oil-soaked dunes are hungry competitors ready to step in the minute IBM falters and gives them an opening.

The Saudi businessmen and merchants, on the other hand, regardless of their wealth, are famous all over the world for being close-chested operators and are also receptive to talk of cost reduction or performance upgrading.

One thing competitors have going for them in Saudi Arabia, according to another NCR marketing man, is that IBM is regarded there as just another company — not the computer industry supergiant.

Perhaps that is the reason Itel Corp. is so active in Saudi Arabia and soon will be installing an AS4 system at Saudi Computer Services (SCS) in Jeddah. That service bureau is the first in the western province of Saudi Arabia and now uses an IBM 370/135.

SCS, which serves foreign contractors, Saudi businesses and government agencies, has in fact become an exclusive Itel representative in Saudi Arabia. It is clearly in a superior position to influence and support the rapidly growing needs of Saudi computer end users. SCS also uses Software International's financial packages and markets Syncom Systems, Inc. software and Memorex Corp. disks and tapes.

International News

The Saudi service company is also branching out into training and is already running courses for contractors and project management. In fact, several industry observers in Saudi Arabia have pointed out that the rapid explosion in DP usage is creating a dire need for systems analysts, programmers and computer operators, which in turn is forcing a limit on market expansion. NCR, for example, cannot tolerate more than a 40% increase in sales per year at present because of inadequate supplies of trained personnel to operate equipment delivered to customers.

The situation, not unlike that in the U.S. during the 1960s, is creating opportunities for skilled workers.

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We are a Big Eight CPA firm with a well established management consulting practice. We are continuing to expand at a rapid pace, and as a result, we have position openings for EDP/MIS specialists in our Grand Rapids, Michigan office. Our clients include business, financial, manufacturing, health care and governmental organizations. Overnight travel requirements are minimal with most projects being located in the Western Michigan area.

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Marshall Field & Company

SYSTEMS PROGRAMMER

Marshall Field & Co. seeks a qualified individual to fill a position as a Systems Programmer on our Information Systems Staff. We have just installed a Univac 1100/82 multi-processor and require a highly skilled software programmer to provide additional support for this system.

Candidate should have a minimum of 3 years experience with large scale operating system software. Experience with Communication networks and Data base Management Systems is also desirable.

This is an opportunity to join a highly professional staff in developing comprehensive retail information systems. In addition to excellent salaries, this opportunity offers good growth potential.

Please send resume, including salary history and references to:

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Please rush your letter or resume on a strictly confidential basis to:

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Have the Know-How AND Professional Experience? Then teach at Datapoint.

Datapoint Corporation, a growing leader in the computer and data processing industry, has an immediate opportunity for a Software Instructor at our San Antonio corporate headquarters.

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Datapoint provides excellent income and fringe benefits in addition to the potential for career development.

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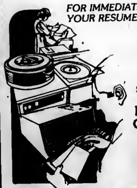

Mr. John Ross
Datapoint Corporation
Data Processing Division
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Mail Station M-84
San Antonio, Texas 78284

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New Corporate VM/370 Data Center

Northwest Industries, a $2 billion multi-industry company, is establishing a VM/370 interactive data center. This IBM 158 AP facility will be utilized for decision support and mathematical modeling applications.

We are assembling a topnotch staff to develop and support this data center. The emphasis is on **SOFTWARE EXCELLENCE** with the following positions open:

- **DATA CENTER MANAGER**

  Total data center responsibility with a staff of 10 software and operations professionals. Will provide a superior level of service and an enhanced VM/370 CP/CMS and communications environment.

  Experience should include successfully managing software staffs and enhancing and maintaining IBM operating systems.

- **SENIOR SYSTEM SOFTWARE SPECIALISTS (2)**

  VM/370 CP/CMS operating system responsibility. Will develop, generate, and support an enhanced operating system.

  Should have in-depth VM/370 experience including modifications and support.

- **SENIOR SYSTEM SOFTWARE SPECIALIST (1)**

  IBM 3705 based communications responsibility. Will develop, generate, and support an effective communications service.

  Should have in-depth communications experience including network design and support.

These positions provide a high degree of challenge, reward, professional development, and offer an attractive compensation package. To explore these opportunities, please call Michael Deleney, Corporate Staff Personnel Manager, at (312) 876-7000, ext. 591, or respond with a resume or letter to Laurance T. Burden, Director—Management Information Services.

Northwest Industries, Inc

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DIRECTOR OF DATA PROCESSING ELMIRA COLLEGE

Position available immediately. Duties include systems analysis, program development, programming, related institutional research, and staff supervision. New PDP 11/34. RSTS/E and RPG II experience helpful. Salary will depend upon qualifications. Send application letter, resume and three references to Thomas R. Walton, Executive Assistant to the President, Elmira College, Elmira, N.Y. 14901. Elmira College is an equal opportunity employer. We encourage applications from women and members of minority groups.

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You will be employed by Hennepin County government (Minneapolis and suburbs), an urban center of 1 million residents nationally recognized as a prime quality of life area. The successful candidates will have solid analytical design experience in all phases of development, preferably in an IMS-DB/DC environment. If you desire challenge and advancement, combined with an excellent salary and benefit package, send your resume including salary history, in confidence, to:

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(Engineering Applications)

Motorola's Government Electronics Division in Scottsdale, Arizona has an immediate requirement for a senior programmer/analyst to provide the algorithms and analysis for the new graphics and related software tools to be developed. An advanced degree is preferred. Candidates must have recent experience in Topology and Graph Theory.

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Supervisor
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SR. PROGRAMMER ANALYST

To develop online patient care systems. COBOL experience is required; TOTAL experaince is desirable.

PROGRAMMER ANALYST

To develop programs using online technology, COBOL, and TOTAL.

Send resume in confidence to: Mr. Thomas B. Hembury, Professional Recruiter, University of Cincinnati Medical Center, Health Professions Building, Eden & Bethesda Aves., Cincinnati, Ohio 45267.

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SALT LAKE CITY, UTAH

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* Financial Systems
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ASSISTANT DATA PROCESSING MANAGER

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APPLICATION PROGRAMMERS

to support existing long-term contracts.

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Communication S/W
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IT'S HAPPENING
Saturday, July 29th
Sunday, July 30th

THE COMPANY

Here's a brief preview of who we are and what we do. We're the Technical Services Division of Sperry Univac, whose mission is to provide advanced systems design, application analysis, programming and operations support. Principal clients are located at Dahlgren, Virginia and Patuxent River, Maryland.

THE LOCATION

Both Dahlgren, Virginia and Patuxent River, Maryland are only 60 miles from Washington, D.C. Nearby communities Fredericksburg, Virginia and Lexington Park, Maryland provide a comfortable lifestyle, yet retaining access to the city.

THE OPPORTUNITIES

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SR. SOFTWARE SPECIALIST, $25,000+. Progressive Phoenix client seeks individual to support multi 370's. Req's large shop exp. MVS; VTAM; perf. measurement. Excellent growth; will lead to mgtm. Refer RS.

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SR. SYSTEMS to $25,000. Leading Md co seeks indv with systems design & implementation experience. Banking or insurance bkgrd. Prefer large scale IBM, OS, COBOL environ. Refer RN.

SYSTEMS-MICROPROCESSOR to $25,000. Challenging opportunity in attractive Mid-Atlantic suburban location. Involved in design & development of unique & dynamic new applications. BS req'd. 0-5 yrs related exp. Refer HG.

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PROGRAMMER ANALYST

Reporting to our Financial System Section Supervisor you will be responsible for providing programming and analysis support to the systems area and translating user requirements into defined business systems. You will typically be involved in state-of-the-art analysis, design, and implementation of new systems with some responsibility for existing systems.

You'll need 2-5 years solid cobol programming experience, preferably some analysis within the financial area of a large company, and the ability to deal effectively with all user departments. Analysis training and financial systems experience a plus.

Please submit resume and salary requirements to:

Al Zink
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CW7-17
50 Dunham Road
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Challenging new position open in sunny Albuquerque to project manage a dual EMS Computer System to be operational in 1979. Responsibilities include approval of manufacturer developed software and hardware documents consistent with contractual guidelines and project objectives.

Upon completion of system acceptance testing and field integration, the Programmer will develop new power applications programs and other programming techniques, while being responsible for on-going software maintenance.

Applicant should possess a background in, or knowledge of, Electric Utility Power Operation and be experienced in Assembly, Fortran and other computer languages.

If interested, please send resume, salary history and reference to: Plains Electric Generation and Transmission Cooperative, Inc. 2401 Aztec Rd., NE, Albuquerque, NM 87107

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COMPUTER CENTER DIRECTOR

Responsible for managing and directing the operations of the campus Computer Center and providing computer services to faculty, students, and administration and to contracted public agencies. The Center has an IBM 370/135, a System 7 for library control, communication system linking over 50 terminals, and microcomputers. The Computer Center has a staff of 17 full-time employees. Candidates must possess appropriate academic preparation (Ph.D. in Computer Science or related field preferred) with demonstrated competencies in developing innovative programs in the use of the computer and have a minimum of five years' progressively responsible experience in data processing systems, design, programming or operations, including three years of managing all phases of a data processing installation, preferably at an academic institution. Salary: $24,254 to $31,824, with excellent fringe benefits. Appointment Date: October 1, 1978, or sooner. By August 31, 1978, send resume, transcripts, and three recent letters of recommendation plus other supporting documents to Ms Carol Matteson, Assistant to the President, Slippery Rock State College, Slippery Rock, PA 16057. Affirmative Action/Equal Opportunity Employer.

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University of Wisconsin-Parkside seeks two qualified and experienced individuals to develop and enhance our university administrative systems.

ASSOCIATE DIRECTOR

This individual will direct the activities of four programmer/analysts in developing, enhancing and maintaining our on-line university systems. The successful candidate will assume the leadership for system design and implementation of the on-line administrative systems.

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Minimum starting salary ranges from $18,000 to $21,000 depending upon experience, education and ability. Outstanding fringe benefits and advanced educational opportunities.

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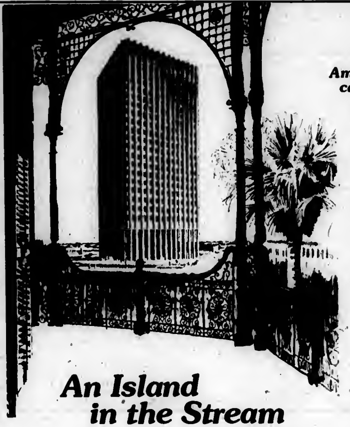

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The individuals we are seeking should have 3-5 years systems analysis and programming experience with business applications, utilizing ANS/COBOL. Experience on UNIVAC 1100 series and degree preferred.

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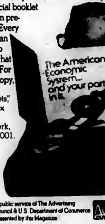
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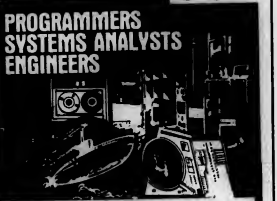

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Programmer/Analysts

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***SR. SYSTEMS ANALYST** 5 years + financial system design CICS/VS or IMS/VS experience	$17,000-$26,000
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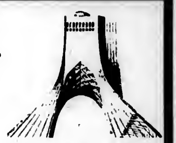

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Murray State University
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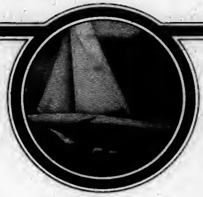

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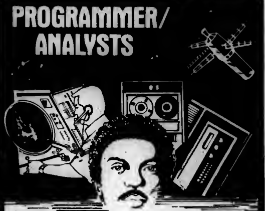

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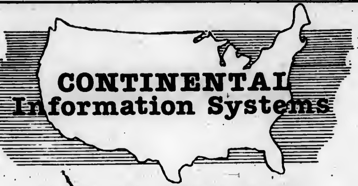

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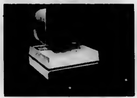

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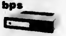
7200 bps 	**MODEM 4800/72** Dedicated line with optional multiport operation for up to three 2400 bps channels	$6900 $165/mo.*	**$1995** **$80/mo.**
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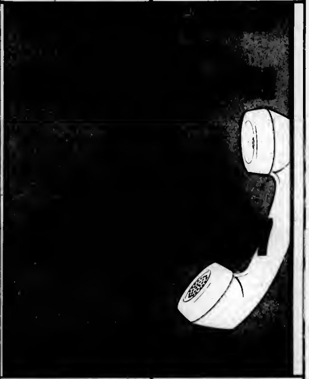

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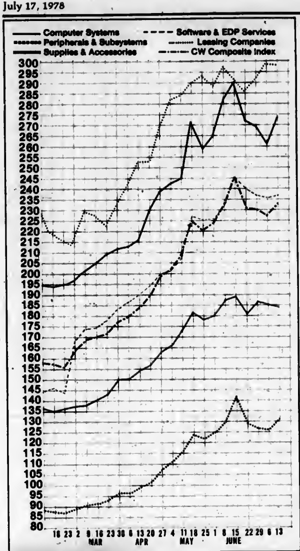

Earnings Reports

BOOTHE COURIER CORP.
Three Months Ended March 31

	1978	1977
Shr Ernd	$5.99	$.33
Revenue	4,923,000	4,351,000
Disc Op	a19,372,000	566,000
Earnings	20,879,000	1,187,000

a-Includes gain of $15,400,000 from sale of subsidiary Courier Terminal Systems, Inc.

DATA DESIGN LABS
Three Months Ended March 31

	1978	1977
Shr Ernd	$.27	$.20
Revenue	7,929,000	6,568,000
Earnings	275,000	222,000
9 Mo Shr	.69	.47
Revenue	21,377,000	17,873,000
Earnings	694,000	519,000

DATAPRODUCTS
Year Ended March 25

	1978	1977
Shr Ernd	$2.04	$1.63
Revenue	138,648,000	119,298,000
Earnings	15,523,000	a12,164,000
3 Mo Shr	.57	.41
Revenue	36,914,000	30,386,000
Earnings	4,322,000	3,075,000

a-Includes gain of $1,116,000 on sale of building.

INFOREX
Three Months Ended March 25

	1978	1977
Shr Ernd	$.16	$.14
Revenue	15,558,000	14,406,000
Tax Cred	52,000	79,000
Earnings	474,000	429,000

MANAGEMENT ASSISTANCE
Three Months Ended March 31

	1978	1977
Shr Ernd	$.48	$.53
Revenue	47,939,000	36,519,000
Tax Cred	284,000	1,772,000
Earnings	3,771,000	4,127,000
6 Mo Shr	.97	1.03
Revenue	92,312,000	71,662,000
Tax Cred	474,000	3,163,000
Earnings	7,501,000	7,934,000

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Telex: SECCO AA25468

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, JULY 12, 1978

All statistics compiled, computed and formatted by
TRADE QUOTES, INC.
Cambridge, Mass. 02139

EXCH		PRICE			
		1978 RANGE (1)	CLOSE JUL 12 1978	WEEK NET CHNGE	WEEK PCT CHNGE
	COMPUTER SYSTEMS				
A	AMDAHL CORP	28- 56	36 1/2	+4 1/2	+14.0
N	BURROUGHS CORP	59- 80	73 1/4	+1 1/4	+1.7
O	COMPUTER AUTOMATION	23- 38	33 1/2	+1 1/2	+4.6
N	CONTROL DATA CORP	23- 36	34	+3 1/4	+10.5
O	CRAY RESEARCH INC	21- 44	42 1/E	+2 5/4	+6.9
N	DATA GENERAL CORP	42- 61	57 5/4	+4 3/4	+8.9
N	DATAPOINT CORP	54- 64	59 1/4	+5 7/8	+6.9
N	DIGITAL EQUIPMENT	39- 55	45 7/8	0	0.0
N	ELECTRONIC ASSOC.	2- 8	4 5/8	+ 3/8	+10.4
A	ELECTRONIC ENGINEER.	12- 19	18 1/8	+ 5/8	+2.1
O	FOUR-PHASE SYSTEMS	19- 32	50 5/4	+E 1/4	+7.8
N	FOXBORO	E8- 40	36 7/8	0	0.0
O	GENERAL AUTOMATION	7- 19	18	+ 7/8	+5.1
O	GRI COMPUTER CORP	1- 1	1 3/8	0	0.0
N	HEWLETT-PACKARD CO	62- 84	82 5/8	+1 1/2	+1.8
N	HONEYWELL INC	43- 59	37	+2 1/E	+4.5
N	IBM	236-ET4	288 3/8	+ 5/8	+0.1
O	MANAGEMENT ASSIST	9- 18	16 1/4	+1 5/8	+11.1
O	MICRODATA CORP	10- 17	[illegible]	- 1/8	-0.7
O	MINI-COMPUTER SYST	3- 8	5 1/4	+ 1/4	+5.0
O	MODULAR COMPUTER SYS	7- 15	12 1/2	+ 3/4	+6.3
N	NCR	37- 58	53 7/8	+2 3/6	+3.1
O	PRIME COMPUTER INC	20- 39	27 3/4	+ 5/8	+2.3
N	PERKIN-ELMER	17- 26	23 5/8	+ 1/2	+2.1
N	RAYTHEON CO	29- 51	51	+5 3/8	+11.7
N	SPERRY RAND	53- 45	41 1/2	+ 3/4	+1.8
O	SYCOR INC	8- 24	24	0	0.0
A	SYSTEMS ENG. LABS	11- 21	16 5/4	+ 5/4	+4.6
A	WANG LABS.	12- 26	22 1/2	+ 3/8	+E.3
	LEASING COMPANIES				
O	ALANTHUS CORP	3- A	5 3/4	+ 1/2	+9.5
O	BOOTHE COURIER CORP	13- 18	15 5/8	- 1/4	-1.8
O	COMDISCO INC	9- 20	17	+1	+6.2
A	COMMERCE GROUP CORP	1- 1	8/8	0	0.0
A	COMPUTER INVSTRS GRP	1- 1	7/8	- 1/8	-12.5
N	DATRONIC RENTAL	1- 2	1 1/2	0	0.0
A	DCL INC	3- 4	3 7/8	- 1/4	-6.0
N	DPF INC	8- 15	11 1/8	- 1/4	-2.1
N	ITEL	16- E7	E4	+ 7/8	+3.7
N	LEASCO CORP	24- 38	32	+ 3/8	+1.1
O	LEASPAC CORP	1- 4	3	- 1/2	-14.2
A	PIONEER TER CORP	5- 7	5 3/4	0	0.0
N	U.S. LEASING	13- 17	16 5/5	+1 5/8	+10.8

EXCH		PRICE			
		1978 RANGE (1)	CLOSE JUL 12 1978	WEEK NET CHNGE	WEEK PCT CHNGE
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	1- E	1	- 1/4	-20.0
O	ANACOMP INC	8- 20	1A 7/8	- 1/8	-0.7
A	APPLIED DATA RES.	8- 14	14 1/8	- 5/8	-2.5
N	AUTOMATIC DATA PROC	24- 34	50 7/8	+1 3/8	+4.6
O	COLEMAN AMERICAN COS	1- 2	1 7/8	0	0.0
O	COMPU-SERV NETWORK	7- 12	8 3/4	-1	-10.2
O	COMP ELECTION SYSTMS	9- 10	9 1/4	+ 1/4	+2.7
O	COMPUTER HORIZONS	1- 5	6	0	0.0
O	COMPUTER NETWORK	8- 12	10 7/8	+ 3/4	+7.4
N	COMPUTER SCIENCES	8- 15	11 1/8	+ 1/2	+4.7
O	COMPUTER TASK GROUP	1- 4	5	- 1/4	-7.4
O	COMPUTER USAGE	2- 4	E 5/6	0	0.0
O	CONSHARE	6- 17	14 1/4	+1 1/4	+9.5
O	DATA DIMENSIONS INC	4- 7	5 1/2	+ 1/8	+E.3
O	DITATAB	1- 2	7/8	0	0.0
N	ELECTRONIC DATA SYS.	15- 23	18 7/8	+ 1/4	+1.5
O	INSYTE CORP	1- 2	1 5/4	- 1/8	-6.6
O	IPS COMPUTER MARKET.	2- 3	5	0	0.0
O	KEANE ASSOCIATES	3- 4	8 1/2	+ 1/4	+4.7
O	KEYDATA CORP	1- 3	2 1/4	- 1/8	-5.E
A	LOGICON	11- 15	12 1/4	+ 5/4	+6.5
A	MANAGEMENT DATA	1- 1	1	0	0.0
A	NATIONAL CSS INC	15- 28	24 3/8	0	0.0
O	NATIONAL DATA CORP	7- 12	16	0	0.0
A	ON LINE SYSTEMS INC	17- 26	25 1/8	+1 1/8	+5.1
N	PLANNING RESEARCH	4- 8	7	0	0.0
O	PROGRAMMING & SYS	1- 1	3/4	0	0.0
O	RAPIDATA INC	3- 6	5	+ 3/8	+8.1
O	REYNOLDS & REYNOLDS	18- 28	E6 1/2	+ 1/4	+0.9
O	SCIENTIFIC COMPUTERS	3- 6	5	0	0.0
O	TYMSHARE INC	18- 27	25 1/8	- 1/8	-0.4
A	URS SYSTEMS	5- 7	6 7/8	+ 8/E	+7.8
N	WYLY CORP	1- 5	4	+ 1/8	+5.2
	PERIPHERALS & SUBSYSTEMS				
N	ADDRESSOGRAPH-MULT	14- 29	E1 5/4	+1 5/8	+6.7
O	ADVANCED MEMORY SYS	7- 14	12 3/4	+ 3/8	+3.0
N	AMPEX CORP	10- 17	14 3/8	+1 1/8	+8.4
O	ANDERSON JACOBSON	5- 9	7 7/8	+ 5/4	+10.5
N	APPLIED DIG DATA SYS	13- 18	14 3/8	- 5/8	-2.9
O	BEEHIVE INT'L	4- 7	4 5/4	+ 5/8	+8.8
A	BOLT.BERANEK & NEW	6- 11	7 7/8	- 3/8	-7.5
N	BUNKER-RAMO	10- 18	15 7/8	+ 1/4	+1.5
A	CALCOMP	3- 9	8 1/4	+ 7/8	+11.8
O	CAMBRIDGE MEMORIES	3- 8	5 5/4	+ 1/4	+4.5
N	CENTRONICS DATA COMP	16- 29	27 1/2	+1 1/4	+4.7
O	COGNITRONICS	1- 4	5	0	0.0
O	COMPUTER COMMUN.	6- 10	7 5/8	- 3/4	-8.9
O	COMPUTER CONSOLES	4- 9	7	- 5/4	-9.6
A	COMPUTER EQUIPMENT	3- 6	4 1/4	0	0.0
O	COMPUTER TRANSCEIVER	1- 2	1 5/8	+ 1/8	+8.3
O	CONTEN	9- 28	24 5/8	+2	+8.9
N	CONRAC CORP	19- 26	19 1/2	- 1/E	-E.5

EXCH		PRICE			
		1978 RANGE (1)	CLOSE JUL 12 1978	WEEK NET CHNGE	WEEK PCT CHNGE
O	DATA ACCESS SYSTEMS	3- 5	4 5/4	- 3/4	-13.6
O	DATA 100	9- 20	19 5/8	+1 1/E	+8.2
A	DATA PRODUCTS CORP	13- E4	19 1/2	- 1/4	-1.2
O	DATA TECHNOLOGY	4- 4	4	0	0.0
O	DATUM INC	2- 5	4 5/8	+1	+27.5
O	DECISION DATA COMPUT	2- 4	5 5/8	+ 3/8	+20.8
O	DELTA DATA SYSTEMS	1- 1	5/8	0	0.0
A	DOCUMATION INC	6- 24	21 3/8	+1 5/8	+8.1
O	DATARAM CORP	6- 24	19 1/2	+1	+5.4
N	ELECTRONIC M R M	4- 7	4	+ 1/4	+4.3
O	FABRI-TEK	1- 2	1 5/6	- 2/5	-11.5
O	GENERAL COMPUTER SYS	1- 2	E 1/4	+ 7/8	+63.6
N	HAZELTINE CORP	10- 16	14 7/8	+1 5/6	+12.2
N	HARRIS CORP	40- 61	56 5/4	+E 1/4	+4.1
O	INFOREX INC	6- 10	8 1/4	+ 1/8	+1.5
O	INFORMATION INTL INC	8- 11	8 1/4	- 1/4	-2.9
O	INTEL CORP	59- 62	59	+1 1/E	+8.6
A	LUNDY ELECTRONICS	4- 5	4 7/8	+ 1/8	+E.6
O	MSI DATA CORP	12- 19	15 1/2	+ 1/4	+1.6
N	MEMOREX	27- 49	40	-E 7/8	-6.7
N	MOHAWK DATA SCI	6- 12	11	+1	+10.0
O	PENRIL CORP	5- 12	8 5/8	+ 1/8	+1.4
N	PERTEC CORP	9- 14	11 1/4	+ 1/4	+2.2
A	POTTER INSTRUMENT	2- E	1 3/4	0	0.0
O	PRECISION INST.	2- 2	2	0	0.0
O	QUANTOR CORP	2- 5	2 5/4	0	0.0
O	RECOGNITION EQUIP	7- 12	10 5/8	+ 1/4	+2.4
O	SCAN DATA	1- 4	3 1/4	+ 1/8	+4.0
N	STORAGE TECHNOLOGY	19- 46	E1 1/8	+2 3/6	+12.6
O	7 BAR INC	11- 19	16 1/4	- 1/4	-1.5
O	TALLY CORP.	4- 9	7	+ 1/4	+3.7
A	TEC INC	6- 10	9 1/4	- 5/8	-3.8
N	TEKTRONIX INC	33- 45	42 1/4	+1 5/4	+4.3
N	TELEX	5- 7	5 5/8	+ 1/2	+10.2
O	TESDATA SYSTEMS CP	13- 20	17	+1 5/4	+11.4
O	WILTEK INC	1- 1	7/8	- 1/4	-22.E
	SUPPLIES & ACCESSORIES				
A	AMERICAN BUS PRODS	6- 9	9 1/4	+ 1/5	+1.5
O	BALTIMORE BUS FORMS	2- 3	3 3/4	- 1/2	-11.7
A	BARRY WRIGHT	14- 28	24	+1	+4.3
O	CYBERMATICS INC	1- 1	1 5/8	0	0.0
O	DUPLEX PRODUCTS INC	10- 27	24	- 1/8	-0.5
N	ENNIS BUS. FORMS	8- 17	14 1/4	- 5/8	-4.2
N	3M COMPANY	43- 57	56 3/4	+2	+3.6
O	MOORE CORP LTD	26- 34	33 1/2	+ 3/4	+2.2
N	NASHUA CORP	18- 51	25 5/8	-1	-5.7
O	STANDARD REGISTER	20- 26	E2 1/4	+ 1/4	+1.1
A	TAB PRODUCTS CO	8- 13	11 5/4	- 1/8	-1.0
N	VARCO	19- E7	24	+ 1/4	+1.8
A	WABASH MAGNETICS	10- 15	15 1/4	+ 3/8	+E.9
N	WALLACE BUS FORMS	18- 26	26	+ 5/4	+2.8

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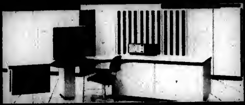

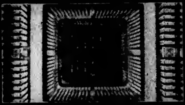

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